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C. L. Meller
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A
 DISSERTATION
 ON
 SIMPLE FEVER,
 OR ON
 FEVER CONSISTING OF ONE PAROXYSM
 ONLY.

*Medicina igitur adhuc taliter comparata est, ut fuerit magis
 ostenta, quam elaborata: etiam magis elaborata quam amplifi-
 cata*

BACON, AUG. SC. LIB. II. CH. I.

*Solent autem homines naturam tanquam ex præalta turri et e
 longe despicere, et circa generalia nimium occupari; quando
 si descendere placuerit et ad particularia accedere, resque ipsas
 attentius et diligentius inspicere, magis vera et utilia fieret
 comprehensio.*

IBID.

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L O N D O N :

PRINTED FOR J. JOHNSON, IN ST. PAUL'S CHURCH YARD.

MDCCXCIV.



GENERAL OBSERVATIONS.

FEVER is a disease, the existence of which no man could have the least suspicion of, supposing him acquainted with the structure of the body, the properties of the solids and fluids, the various operations which go on in it in health, the manner in which they take place, the powers which produce them, the connection of the body and the mind, as well as these are known at this day to physiologists, anatomists, or those who have studied medicine itself, or any of the branches of knowledge conducive, or which have been thought conducive to it. It is therefore only to be known by observing it in the diseased bodies of men afflicted with this distemper. Many are the

authors who have described it, both ancient and modern. It may therefore be supposed that the history of fever should have been rendered very perfect by this time, since it is one of the most frequent diseases, and has been in all ages, and in all countries, more especially as it is likewise one of the most fatal; and as it so occupies the whole system, as to absorb during its continuance all the faculties, both of the body and the mind, in a greater or less degree.

Every man, however, who has read the various descriptions of fever which have been given by authors ancient or modern, of one country or of another, becomes immediately sensible, that neither its causes, rise, progress, or termination, are thoroughly known, or perfectly described, and of this he will be more fully persuaded, if he has frequently had occasion to see the disease.

The history of fever, therefore, is by no means thoroughly understood. That its treatment is not understood thoroughly appears clearly, as the practitioners of different

ferent countries, who attend patients in this disease, nay of the same country, town, and even district, although men of great learning in medicine, employ very different modes.

This subject, therefore, is not exhausted. Many physicians have laboured, if I may use the metaphor, in the geography and culture of this country. But the geography is far from being delineated, the culture is far from being brought to perfection. The author of this treatise can only measure a few bases, carry on a few triangles, examine perhaps the soil of a few fields, cultivate some yards on the surface, or bring out some of those treasures which lie deeper. Many and many new observers, many and many new laborers must be employed to bring the whole knowledge and cultivation of it to perfection.

Since, as has been already said, nothing but the observation of the appearances which take place in a person afflicted with

fever, nothing but seeing the effects of medical instruments employed in the disease, can give mankind any idea, either of its history, or treatment. Nothing can give any man a power of improving the knowledge in this disease, either as to its history, or cure, excepting having seen it frequently; and one not acquainted with the previous knowledge of it, which exists in the world, cannot tell whether he has made any improvement or no. What has gone before, as far as has been related, is open to every man who will take the pains to read and give attention to what is written on the disease.

It is natural for a reader to enquire, what opportunities of observation a man has had who pretends to make some improvement, that he may not waste his time in perusing what contains nothing but dreams. Therefore, it is not impertinent to say, that besides all other opportunities of observing this disease, the author has been for upwards of twenty years one of the three physicians
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of St. Thomas's Hospital, whose walls have contained nearly four thousand patients every year, where the proportion of fevers to other diseases is much greater than the general proportion. As fevers, and indeed all acute diseases give a preference in the admission of a patient, and many fevers originate in this, as well as in all hospitals. His attention has been particularly drawn to this, and other diseases, by describing them, and pointing out the manner of their treatment to students in medicine, three times a year, for thirty years. He hopes therefore, that it may not be thought improper in him to try to contribute his mite to forward the power of medicine, by endeavouring to distinguish this disease, and assist in extricating mankind from its painful and fatal effects.

Fever has obtained its name, in Greek, Latin, Arabic and Persian, principally from the idea of heat, *Pur*, in Greek, fire; *febris*, in Latin, from *fervere*, to burn, &c.

In the language of this country, the vulgar, if they are hot, say that they are in a fever. The intolerable sensation of heat, which is often expressed by patients afflicted with this disease, I not only know by the complaints of patients, but have felt the excruciating effects of it myself.

It has been an idea that many practitioners in the art of healing have cherished, that in every disease there is some appearance, which being present, the disease is present; being absent, the disease is absent. It is indeed so flattering a prospect, and would render a knowledge of the disease so perfectly easy, that men who have considered themselves in the line of medicine, have constantly been extremely apt to give way to the delusion. It is as if, whenever a sailor approached an island, where there were chalk cliffs, he should immediately conclude them to be the snowy cliffs of Albion, and the island therefore of Great Britain; or on the contrary, if he fell in with the Columns of Stafa, that he had fallen

fallen in with the Giants Causeway, of Irene. There are few appearances (symptom is the Greek name for appearance) that never take place excepting in one particular disease; and still fewer particular diseases which do not often take place without any one peculiar symptom. An inflammation, to give a strong instance, but perfectly grounded on anatomical dissection, may take place in the pleura without pain, since not only adhesions have been found on dissection, but suppuration both above and below the pleura, when the patient has never complained of any pain in the side.

Fever, of all other diseases, is that one in which a pathognomic symptom is least to be depended upon; that is to say, an appearance which does not take place when there is no fever, or a fever does not take place when there is no such appearance.

Let me examine those appearances which have been considered as pathognomic.

Heat, that symptom which I have shown as preponderating in the ideas of all those nations whose medical knowledge we are acquainted with, certainly is not a pathognomic symptom of fever.

Until the time of Van Helmont, there was no means of measuring what many Chemists call at present the apparent heat of the body. He first invented a measure of heat by the expansion of air contained in a glass globe, pushing up when heated a fluid through a small cylinder, and allowing when cold the fluid to descend in the same cylinder, and by that means, measure the degree of heat by the expansion or contraction of bodies. This instrument has been since much improved; so that by the difference between the expansion of glass and mercury, as well as between other solids, fluids and vapors, we can measure very exactly what has been called the apparent heat of bodies. By the application of this instrument to the bodies of patients afflicted with fever, the author has often found the heat less than that which was found in the bodies of men
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in perfect health, although all the other appearances which constituted fever were present, even when there was foulness of the tongue, dryness of the skin, frequency of the pulse, delirium, and the patient felt himself very hot. That is to say, the heat of the human body being measured by a very small thermometer, the ball being only the fourth part of an inch in diameter, and the cylindric stem proportionally small; the ball being put under the tongue, the mouth kept shut for four or five minutes, and the respiration carried on through the nostrils, the thermometer has been at 96° , 95° , or even 94° , in some cases. On the other hand, when a patient has felt himself very cold, this measure of heat has shown that the apparent heat of the body, by a thermometer applied in the same manner, was 104° or 105° . This kind of measure of heat being totally unknown till the time of Van Helmont, and not being brought to any kind of perfection till long after his time, we cannot ground any reasoning upon it that can be at all connected with the ideas of Greece, or upon any description of the feelings

feelings of mankind with regard to heat in fevers, where this instrument was not known nor employed.

Bring next into consideration the feel of the patient, with regard to heat and cold. Although his feel of heat is more frequent and of greatly longer continuance than his feel of cold in any fever, which is not fatal in a few hours, yet he undoubtedly feels himself frequently excessively cold; very often, at the beginning of the first attack of fever; often at the beginnings of the attacks, when fevers have intermissions; not frequently, but not very uncommonly, in the middle of fevers, in which the patient, during the course of the disease, is never free from fever.

Another person applying his hand, &c. to the body of a person afflicted with fever, feels a part of the body hot sometimes, when the patient himself feels it cold: sometimes it may be felt to change from hot to cold in almost an instant, or from cold to hot in the same small period of time; and this by no means consonant, either to the
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feel

feel of the person afflicted or to the thermometer.

Heat therefore, considering it in any way that it can be measured, cannot be taken as a pathognomic symptom of fever; that is, an appearance which always takes place when a fever is present, and is always absent when a fever is absent.

It will hardly be thought necessary here to consider heat in the body, which is not shown by any of those measures which I have pointed out, and which has lately been conceived to exist in matter, without being sensible, by producing expansion of solids, fluids or vapors, or sensible to the feelings of mankind or other animals.

Some authors and practitioners have conceived, that cold followed by heat constituted a fever; but every man who has been conversant in this disease, and has attended to its attacks, knows perfectly that it often begins without any cold, measured either by
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the thermometer, the sensation of the patient, or feel of a by-stander.

A lesser degree of heat, measured by the thermometer, the feel of the patient, or of a by-stander, we call cold: In some cases of fever the author has measured the heat, at the first approach of an attack, in all these ways, and very frequently throughout the disease, without ever finding a greater degree of cold than the heat natural to the body, from the first beginning, till the final end of the disease. This will be undoubtedly confirmed by the observation of practitioners and relations of authors.

On the other hand, cold, considered in the sense I have explained, has frequently taken place, according to all the above measures, in diseases, which no practitioner has ever considered as fever; in hysteric affection for instance. Cold therefore cannot be deemed a pathognomic symptom of this disease.

Frequency of the pulse has been more generally considered as a pathognomic symptom

symptom of fever. The pulse, that is to say, the contraction and relaxation of the arteries, which is readily felt in any artery lying near the skin, especially if it be only covered by the skin, enumerates almost always the number of contractions of the left ventricle of the heart. In persons in health, indeed in animals in general in health, the number of contractions of the left ventricle of the heart is wonderfully uniform; in mankind, at an adult age, it is most commonly 73 strokes in a minute, so that it might be almost taken as a measure of time: in men hurried with business of large towns, it varies a little, tho' very little; in perfect health, the number of contractions is rarely found to be less than 70, or more than 75 in a minute. We find not uncommonly idiosyncrasies; that is, dispositions in particular persons, where the number of contractions of the ventricle is fewer; others where there are more than 73 contractions in a minute; but in those persons, in which this takes place, whatever be their number of contractions in a given time, it remains uniform; that is to say, if the number of con-

tractions

tractions of the ventricle be 60, then it is always 60 in health ; if it be 80, then it is always 80 in health : it is very rare to find in such idiosyncrasies the number less than 60, or more than 80, and these idiosyncrasies are very uncommon, one not happening in an hundred times ; or if we take those in which the number is more than 75, or less than 70, not one in a thousand. The contractions in children are more numerous, and more easily disturbed ; in old men not uncommonly less. I felt the pulse of an old man in the Charter House, whose natural number did not exceed 26 contractions in a minute. The number of contractions in old persons is also less regular. In the present enquiry, we may lay aside what happens in children and in old men, and consider the natural number of contractions to be 73 in a minute.

When then frequency of the pulse is taken as a pathognomic symptom of fever, it is meant, that the pulsations of the arteries, that is the contraction of the left ventricle of
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the heart, is more than 73 in number in a minute. But it is by no means agreed by authors or practitioners, that any encrease above 73 in a minute is fever.

It has therefore been a question, what the increase is that constitutes the pathognomic symptom of fever; some have taken 90 pulsations in a minute, or any greater number, as the number which constituted fever. Fever, therefore, according to their sentiments, is always present, when in a person whose natural number of pulsations is 73 in a minute, become 90 or more in a minute: this has induced many to call all diseases fever, in which the pulsation of the arteries arose to 90 strokes or more in a minute. Every man may employ any term, in any sense he chooses, provided he defines it. Suppose therefore we admit that all diseases in which the number of pulsations are above 90 in a minute to be fevers, let me examine what diseases must be included under this name.

Supposing

Supposing that there is a spasmodic contraction of the intestines, it frequently happens, that the pulsations become more than 100 in a minute; then this man must be said to be afflicted with fever. If we exhibit to this man a dose of spices, the contraction of the intestines is carried off, and the pulse soon returns to its natural state. If a person goes down a dance, with more than ordinary velocity, the pulsations are frequently more than 100 in a minute, and therefore this person is afflicted with fever. If a woman should suddenly meet the object of her love, her pulsations are often 100 in a minute, she then likewise is afflicted with fever. But these, and an hundred other cases which might easily be brought, are very far from the disease which I am about to describe, very far from the fevers of all the great practitioners of Greece, Arabia, or even among the majority in modern times.

Frequency of the contractions of the left ventricle of the heart may be present without fever; on the other hand, fever may be present

present without more numerous contractions of the ventricle of the heart. The author has seen in many instances a fever take place, and go on as a continued fever, so that in the middle of the second week, the pulse has been frequent from 100 to 110, or even more, the tongue covered with a brown fur and dry, the skin dry, great depression of strength, costiveness, violent pain in the forehead, the eyes stupid, delirium, strong evening exacerbations; in such cases the Author has known the pulsations become as few as 60, 50 or 45, even in a minute, all the other appearances of the disease remaining the same, that is to say, as they are above described, the fever even encreasing in all other respects. This small number of pulsations, after continuing for two or three days, has given place to a number of pulsations as great as before, so that if a man had attended to the other circumstances of the disease, and not felt the pulse, he would have had no reason to suspect that the pulsations had been fewer during that time. This the author has frequently shewn to the pupils attending St. Thomas's

Hospital, as it was shown to him by Dr. Cullen, Sir John Pringle, &c. &c. It has been observed by many practitioners, and some authors. We certainly should not in this case affirm, that during this time a patient is free from fever : therefore a fever may be present, and that in a great and even fatal degree, without an encrease of the number of pulsations of the arteries, that is, contractions of the left ventricle of the heart.

The number of the pulsations of the arteries is therefore not a pathognomic symptom of fever, since they may be numerous without a fever being present, and less numerous than they are naturally, even in the worst case of fever.

If we examine the restlessness, anxiety, state of the tongue, head-ach, or any other of the symptoms which often take place in fever, we shall find that they also may be present when there is no fever, and absent in a patient afflicted with this disease, and therefore we cannot allow that there is any pathognomic symptom of fever.

DEFI-

DEFINITION OF FEVERS.

MANY diseases have been called fever, even by practitioners of great knowledge and observation, which the author does not mean to include in the number of fevers. In the first place, he excludes all affections of the system which depend upon any other disease. Thus, in phlegmonous inflammations, in pleurisy, for instance, there is often frequency of the pulse, greater strength of the pulse, and hardness; foulness of the tongue; loss of appetite; want of sleep. If the inflammation be carried off, all these appearances subside of themselves, they only depending upon the inflammation of the pleura, and therefore are, according to this rule, not to be considered as fever. So in inflammation of the intestines there is frequency of the pulse, with contraction, hardness, and fre-

quently obstruction, pain in the forehead, dryness, and dusky colour of the skin; the tongue is covered with a brown fur, with great depression of muscular strength, convulsive contractions in the extremities, nausea and vomiting, costiveness; &c. If the inflammation of the intestines is carried off, these appearances all go off, they depending entirely upon the inflammation of the intestines, and, therefore, according to this rule, cannot be considered as fever. In erysipelatous inflammation, that is inflammation of the skin, all the last enumerated symptoms may arise. This inflammation may be cured by the application of alkahol diluted with water, and all the symptoms affecting the other parts of the system disappearing, they cannot be considered as fever. The same symptoms may arise in the dysentery, and if the intestines are restored to their natural state, go off, and therefore cannot be considered as fever. In gangrene and mortification, similar symptoms may arise, and continue, notwithstanding that the dead part is cut off; still I do not include them in fever, because the wound has a tendency to

to gangrene and mortify, and does actually, in a great proportion of cases, gangrene and mortify. It is this disposition to gangrene and mortification which keeps up these appearances, and therefore they depend upon another disease, and are not to be included in fevers, for fever does not give a wound a tendency to gangrene and mortify. If these appearances then constituted a fever, they would not give a wound a tendency to gangrene and mortify. If a phlegmonous inflammation rises in the parts surrounding the dead part when it is not cut off, these symptoms do not appear at all, or if they have taken place they subside. So in like manner, if the dead part be amputated, and the wound has a disposition to good suppuration, which it has sometimes, although rarely, then the appearances, which I have last enumerated, go off if they had taken place, or if they had not taken place before, they do not arise. So in rheumatism, afflicting a particular part of the body, or taking place in various parts by metastasis, it happens frequently that the pulse becomes hard, full, strong, and frequent; the tongue is covered with a white

crust, loss of appetite, great increase of all the symptoms in the evening, and great relaxation in the morning; but these all depend upon the rheumatism affecting particular parts of the body, and if all the topical affections should be carried off, then these appearances which have been enumerated likewise subside, and are not therefore according to the rule laid down a fever. So in tetanus there is frequency together with obstruction of the pulse, head-ach, loss of appetite, nausea, not uncommonly want of sleep, delirium; but these symptoms depending on the spasmodic contraction, or disposition to spasmodic contraction in different muscles of the body, do not constitute a fever. There are many other diseases which might be enumerated that produce affection of the system, generally depending upon the continuance of the disease that gave occasion to them, none of these are for the same reason to be called fever,

When a disease of a part of the body produces an affection of the whole system, in which there are many appearances similar
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to those which take place in fever, if upon removing such disease, the affection of the system does not immediately go off, but begins to subside, and continues gradually to subside, such affection, for the same reason, cannot be called fever.

The next rule is, that a disease which affects a part of the body only, that is, any particular member of the body, such as an arm, the head, stomach, &c. and does not affect the other parts of the system, or which produces affection of other parts of the system, depending only on the affection of that part, cannot be called fever.

Practitioners not well versant in this disease, have frequently supposed themselves sagacious in discovering such diseases to be fevers. Thus an hemicrania, which takes place by paroxysms, which sometimes begin with coldness, and produce frequency of the pulse, foulness of the tongue, loss of appetite, heat, and which observes sometimes a quotidian, tertian, or quartan type, has

been called and conceived to be a fever, of which it has nothing of the essence.

It is not to be concluded from what has been said, that a fever cannot exist along with any other disease. A fever may begin first, continue for some time, and another disease may arise afterwards without carrying off the fever; it may continue along with it; the going off of the second disease may not carry off the fever; but the other disease being carried off, all the symptoms of fever may still remain, and it may go through its course. This seems to be a case which has been with difficulty understood by practitioners. For example, a man shall be seized with a coldness, anxiety, depression of strength; the coldness may be followed by heat, frequency of the pulse may take place, head-ach, foulness of the tongue, and other febrile symptoms; then there shall arise after some hours, or even after some days, pain in the side, increased on inspiration, and constant with cough, difficulty of breathing, hardness, fullness

fullness and strength of the pulse, and all the other symptoms of pleurisy : the pain in the side, and all the pleuritic symptoms may be removed by bleeding, and other remedies ; yet after there is no longer any pain in the side, the pain in the forehead, the foulness of the tongue, depression of strength, and all the febrile symptoms may continue, and the disease may go through the remaining part of its progress just as if no pleurisy had arisen in it.

Such cases are rendered more difficult, in as much as it happens, not uncommonly, that another disease arising in fever cures the fever, and all the appearances which continue afterwards are entirely produced, or kept up by this second disease, the fever having entirely left the body. Thus, if a fever should take place, with coldness followed by heat, frequency of the pulse, pain in the forehead, great depression of muscular strength, and the other symptoms of fever ; in two or three hours an inflammation of the intestines may arise, and cure the fever, although, however, the fever is carried

ried off, the head-ach continues, and foulness of tongue, the pulse becomes more frequent, as well as small, and contracted; but these appearances, although they may be the same with those which took place in the fever, yet depend upon the inflammation of the intestines alone. If the inflammation of the intestines be cured by general or topical bleedings, fomentations, and other remedies, which have no tendency to carry off the fever, all these appearances will gradually subside, and cease in a very short time after the inflammation of the intestines is cured.

It was thought necessary, before entering into a description of fever, to consider these preliminary subjects. The description of the disease is next to be entered upon.

A fever is a disease which no knowledge of the structure of the human body, as far as it is at present known, no knowledge of the properties of the fluids, as far as they have hitherto been investigated, no knowledge of the action of the moving parts, as far as they

they have hitherto been observed, could give the smallest ground of supposition, that this disease could ever have existed. In showing its history, therefore, observation of the disease is to be entirely adhered to, without any reasoning why, or how any thing in it takes place, or without any theory, as it has been called. It would be just as fruitless, at least for any useful purpose, as if a geographer were not to describe a country, but reason why an hill should be placed in one region, valley in the other ; why one shore is rocky, another sandy ; instead of actually giving the situation of the hills and valleys, the rockyness or sandyness of the shores.

A fever is a disease which affects the whole system ; it affects the head, the trunk of the body, the extremities ; it affects the circulation, the absorption, and nervous system ; it affects the skin, muscular fibres, the membranes ; it affects the body and affects likewise the mind. It is therefore a disease of the whole system, in every kind of sense, but it does not affect the various parts of the system uniformly and equally ; but on
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the contrary, sometimes one part is much more affected in proportion to the affection of another part ; sometimes those parts which were most affected at one time, are least affected at other times, so that the appearances which are the principal ones in one fever, are by much the slightest in another fever, or sometimes are totally absent. This has given great ambiguity to this disease. To describe it, it is necessary to suppose a case, in which all the appearances which ever take place as essential to the disease should be present, and in an equal degree, though no such case ever happened, especially as the presence of one appearance does not, in any degree, necessarily imply the absence of another. For instance, in most fevers there is pain in the forehead, in some there is no pain in the forehead ; in most fevers there is foulness of the tongue, in some the tongue is of its natural appearance ; but the presence or absence of head-ach has no influence on the foulness of the tongue, and the presence or absence of the foulness of the tongue has no influence on the head-ach ; so that there may be great head-ach, and great foulness of the

tongue, both together in the same patient ; or there may be no great head-ach, and great foulness of the tongue in one patient ; or there may be little foulness of the tongue, and great head-ach in another patient ; or there may be but little foulness of the tongue, and little head-ach in another patient ; or there may be head-ach with no foulness of the tongue in one patient ; or there may be foulness of the tongue, and no head-ach in another patient ; or there may be neither head-ach nor foulness of the tongue in another patient ; and so it may be of any other two symptoms whatever, which occur in this disease.

Fevers take up different times in their natural duration ; sometimes they go through the whole of their natural course in eight, ten or twelve hours, so that the patient is seized with the disease, all the symptoms arise which constitute the essence of it, the natural cure takes place, terminates the disease ; or in other words, a variety of different appearances take place, the disease is entirely terminated, and health restored in
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this period of time. This, therefore, must be considered as a complete fever, since every thing which is essential to fever happens in it. If a man making a journey goes with the velocity of the wind, and another with that of a snail, the journey is equally performed, although in different times. If the journey consists of one stage, or of many stages; in the first instance, the journey will be completed in one stage as perfectly as in the other, it will be completed in the several stages. When a fever goes through its whole course in eight, ten, or twelve hours, it has completed its existence as perfectly as if it had taken eight or ten months. If it completes its course in one stage, it has completed it as perfectly as if it had gone through many similar, or even dissimilar stages. This is clearly the idea of Sydenham, one of the very first authors for accurate observation, as well as many other great authors and practitioners.

If a disease completes its course in a short time in some cases, and in others takes a longer time in completing its course, it is sometimes best to consider its history in the one case, and sometimes in the other.

other. If there is not time for the appearances to be observed distinctly, then undoubtedly we should take those cases where the course of the disease occupies a longer period of time. If, on the contrary, there is sufficient time for observing with great enough accuracy, all the different appearances in that case, it is better to take the disease which occupies a smaller period of time in its course, because it is less subject to be mixed with any other disorder, the appearances of which may be improperly taken for the appearances of the disease which is meant to be described.

A fever which goes through its course, and is completely terminated in eight, ten, or twelve hours, gives sufficient time to observe all the essential appearances which take place in the disease, and therefore it is to be first attended to.

A fever which terminates in less than twenty-four hours, terminates in less than a day and night, therefore was called by the Greeks ephemera. Many modern authors, such

such as Boerhaave, have considered any little disorder that arises from exercise, eating too large a quantity of food of difficult digestion, drinking too much wine, or any other such cause of a disease, which terminated in less than twenty-four hours, an ephemera; but these, like Boerhaave himself, have not been clinical practitioners, that is practitioners who attended any considerable number of patients confined to their beds with fevers. The author has seen several fevers in which all the essential appearances took place, and terminated in eight, ten, or twelve hours. It is such a fever that I am now, therefore, in the first place to describe, taking afterwards all the other varieties which occur.

A fever frequently begins with very marked symptoms all at once; that is, a man in perfect health feels himself diseased to a great degree, in less than a minute. For example, supposing a man sitting down to dinner with a great appetite, feels himself instantly so much affected with this disease as not to be able to touch a morsel. He may be
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thus suddenly affected at any time in the twenty-four hours, but not equally; a great many more fevers begin between eight in the morning and eight in the evening, than take place between eight in the evening and eight in the morning. There is a remarkable difference; according to the author's observation, at least ten fevers take place between eight in the morning and eight in the evening, for one that takes place between eight in the evening and eight in the morning.

It is to be remembered, that the history of fever is to be given here as it arises from observation, and not from any supposition. It is not therefore pretended to be understood, why this difference of proportion should take place. Some have supposed that the sun's passage over the meridian has an effect, but there does not appear to be any ground for this, because the number of first attacks of fever, which take place at noon, or near it, are not remarkably greater than those which take place two or three hours sooner or later. In short, fever is a disease, the whole of the appearances of

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which have been in no ways accounted for.

The first appearance which generally takes place is uneasiness and restlessness, a general uneasiness, the patient feeling himself ill, but incapable of fixing upon any particular pain in any part of the body. This uneasiness affects the mind at the same time. Perhaps in this case it is the mind which is first affected. It is indeed a proposition risked with great doubt, that a disease should be in the mind, not in its moral sense; those disorders which are found in the mind, connected with bodily disease, having been considered as arising from some derangement in the body. This subject will be considered more fully afterwards, the author offering it with the greatest diffidence. Along with this uneasiness there is a restlessness, the patient wishing to change his place or posture frequently; the mind likewise cannot rest upon one object, it often wanders from one to another subject. At the same time there is a feel of weariness which resists the disposition in the patient to change his place and posture, and resists the disposition

sition of the mind to alter the object of its attention, rendering the wish for such constant changes ineffectual : with these arises an actual inability of exerting the muscular powers, or performing any of the functions of the body ; and also an actual inability of exercising the great faculties of the mind, the powers of perception, memory, arrangement of ideas, and of the judgment, in the same degree that they existed in health. The degree in which these take place is extremely different in the attacks of different fevers ; but these appearances are very rarely absent, although indeed they may also happen in other diseases.

This inability, which is common both to the body and mind, has been called weakness or debility. It appears to the author, that it ought rather to be called depression of strength, as he believes it has been by some authors. That is, it is not that the powers of the body are lost, but they are prevented from acting by the disease. If the powers of the body were really taken away, then this inability of exerting the powers of the

body and the mind would remain after the disease was removed ; but it does not remain, for if the disease ceases in eight, ten, or twelve hours in any of the ways hereafter described, the inability ceases likewise, and both the body and mind can exert themselves with a vigour nearly equal to what they could have done just before the disease began, or in perfect health. If such a weight were laid upon a spring moving a machine as to overcome it without destroying its elasticity, that spring would be prevented, either altogether, or in a certain degree, from keeping up the motions of the machine ; but that unusual weight being removed, the spring would immediately be enabled to perform all its former functions with the same force and regularity as before such weight was laid on ; whereas when application had been made which diminished the elasticity of the spring, then it could not produce its former effects until means had been taken to restore its temper and force.

Along with these, but more commonly after them, it frequently happens that the
patient

patient feels a sense of cold, the same kind of sensation that he feels when surrounded by a colder medium than he is accustomed to ; he wishes therefore to go near a fire, or into the rays of the sun, or to put on warmer cloathing ; he does not therefore feel a sense of internal but external cold ; it is not that sensation which is often called a feel of cold in the stomach ; but it is, as it were, that the patient was in a cold atmosphere, or put on cold cloaths. This appearance is vastly more uncertain than the restlessness, sense of uneasiness, weariness, and inability.

It is not my intention to enter into any physiological disquisition, because all physiology, as far as it is hitherto known, is totally or nearly useless in explaining any thing which happens in fever ; therefore, I do not enter here into any of the ideas that have been held with regard to the causes, which have been thought to govern the temperature of the bodies of animals. I proceed, therefore, to relate this singular circumstance, that when a thermometer, ap-

plied to a part of the body, shows a greater degree of heat, the patient himself feels himself cold, and sometimes in that very part where the thermometer shows a greater degree of heat. Practitioners have not been sufficiently correct in relating this phenomenon ; for if a man feels cold in the exterior parts of his body as if he were in a cold medium, which is a sensation, as has been already mentioned, which takes place in fever, he does not conceive that his tongue is cold ; if then a thermometer be placed under the tongue, so that the heat measured by it is greater than in the natural state ; it is not to be taken as contradicting the patient's feeling, because he did not feel that part of his body cold. In the very parts which the patient feels cold, as in the hand, for example, a thermometer sometimes shows a greater degree of heat than it would have shown if it had been applied to the hand under all the same circumstances when the patient was in health. This is by no means always the case, for it frequently happens, that in the exterior parts of the body, the thermometer ac-

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cords with the feel of the patient, more frequently indeed in the exterior parts of the body than under the tongue, and as far as we can employ it within the body, or examine the heat of the interior parts by any means. The thermometer shows sometimes in the attack of fever a less degree of heat than takes place in the natural state of the body: 94° of Fahrenheit's thermometer is the lowest that has been observed by the author, in as far as the interior degree of heat could be ascertained with a sufficient degree of precision.

Bodies, by certain means, may be heated only. For example, the rays of the sun heat bodies; but the absence of the rays of the sun, or any action of the sun, does not cool bodies. In other words, the sun being on one side of the earth heats bodies, but the sun being on the other side of the earth does not cool them. The cold which takes place when the sun does not heat any part of the earth, arises always from causes which do not depend upon what part of the earth is objected to the sun. So

friction heats bodies, but the absence of friction employed in any way does not cool them; when the friction ceases, the loss of heat which it produced is totally dependant upon causes with which friction has nothing to do. In other cases, causes which produce heat have similar ones which produce cold. So in fevers, fever produces cold without any other means except the fever itself. A physician, or a by-stander, holding the hand of a person in the attack of a fever, feels, in less than five seconds, a great degree of cold in that hand. A thermometer applied, falls to a lower degree than it would have done if applied some seconds before, even if it had been previously brought up to something more than the ordinary heat of that part of the body, and therefore in a much less time than the heat of the body could possibly have diffused to the surrounding medium. In Europe, we always live in an atmosphere colder than the natural heat of the body, therefore the human body is always hotter. If the cause, whatever it may be, that produces this greater degree be removed, and prevents it from acting sufficiently

ficiently strong, a greater degree of cold, as shown by the thermometer, would certainly take place, from the heats being dissipated to the surrounding substances. But there are parts of the earth where it happens for several weeks, that the heat of the atmosphere, and other mediums in which men live, is greater than that of the human body. Whether in such cases the attacks of fever are attended with greater degree of cold, as pointed out by the thermometer, we have no observation; but the author has very good evidence of the sensation of cold taking place on the attack of fever, even when the heat of the atmosphere, in the shade, is considerably above the natural heat of the body. This heat is very nearly uniform, not varying a degree of Fahrenheit's thermometer in any climate in health, when measured under the tongue, or by such means as can be employed to ascertain the heat in the interior parts of the body. The author therefore would presume that an attack of fever has the power of diminishing the heat, as far as can be judged of by a thermometer, without its being dissipated to surrounding bodies, or diminished by any method by which

which a lesser degree of heat is given, by any other means than by fever itself. We judge of cold by the feel ; that is to say, if a substance of a certain temperature of heat be applied to the skin, or the mouth, or the stomach, or some other parts of the body. We feel a sensation of cold on touching the skin of a patient in the attack of fever. This sensation very often neither accords with the sensation of the patient, nor the degree of heat shown by the thermometer. This is an appearance so extremely unlikely in itself, that the author, when it was related to him, thought it quite impossible. It may be found in many authors, although not laid down with great precision, but frequent attention to the attacks of fevers has convinced him perfectly, that a part which the patient feels cold, feels hot to a by-stander, and *à contra*. But this is very far from being always the case ; it happens often that the patient and the physician, when he has his hand upon the arm of his patient, shall agree with one another perfectly in their idea of coldness, and the thermometer shall sometimes agree, and sometimes disagree with them.

In the attack of a simple fever, which is at present attempted to be described, the degree of coldness measured by the feel of the patient, the feel of the by-stander, or the thermometer, is extremely unequal in different parts of the body. It is most equal to the patient himself; but that is common to the general sensations of mankind in health; for if a man should sit in a warm room, and there should be an hole in the door blowing against a particular part of his body, although the cold air be not applied to a circle of above two or three inches diameter on the surface of his body, he feels universally cold. To a thermometer, or a by-stander, the cold of different parts of the body frequently feels very unequal, and very fluctuating.

With these symptoms, a diminution of sensation takes place. Sensation is partly an affection of the body, and partly of the mind. In the first place, it is necessary that some impression should be made on some part of the body, or at least that some
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mechanical affection should be produced, in order that an idea should be excited in the mind. As for example, the picture of an object must be painted upon the retina by the lenses of the eye, in order that the sensation of vision should take place. It is true, that a man sometimes may, and does conceive that he sees an object, light for instance, although no such object is painted on the retina ; but this is memory, and not sensation, for no new idea of any visible object was ever acquired by such a sensation. It is well known, and I believe universally allowed, that all new ideas arise in the human mind from impressions made on the sensible parts, except such as arise from the consciousness of its own operations ; but an impression may be made on any sensible part without exciting any idea in the mind. A man, for example, sitting on the bench of a play-house, had no idea of the hardness of the bench when he saw Garrick in Lear bring the body of Cordelia upon the stage. The mind must be vacant to draw its attention to the impressions made upon the body, in order that ideas shall be excited by such

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impressions. When we speak, therefore, of the sensibility of the system, we must be careful to discriminate between these two functions, viz. the impression made on the organ, and the sensation excited on the mind.

The first thing that is to be treated of is, how far the impressions made upon the body have their power of exciting ideas in the mind in fever diminished.

In the first place, in some cases the impression upon the body must be much less, when an extremity is really much colder than in a natural state. A substance likewise colder to the thermometer cannot produce the same impression of cold upon the skin of that extremity that it would if the extremity had been warmer, for the sensation of cold depends upon the temperature which the skin has been accustomed to.

In the second place, the depression of the muscular power may render the impression upon the body less perfect. The muscles of the eyes, by changing the convexity of
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the lenses of the eye, adapt the focus of more or less distant objects, in such manner as to paint their picture distinctly and completely on the retina ; but if the muscles of the eye have their strength depressed, they cannot so adapt the convexity of the lenses of the eye as to paint the picture of the object so perfectly and distinctly, therefore the mind cannot take so distinct and perfect an idea.

Perhaps the same thing may be said of the ear, where it is equally necessary that not only the tympanum should have its due tone, but that likewise all the muscles and moving parts which actuate the small bones may have their powers depressed, and so may the bones of the fibrils.

That crust which begins to be formed upon the tongue in general, in the very first beginning of the attack of fever, may put the substances which produce taste at a greater distance from the sensible surface of it, and so may prevent the same mechanical effect from being produced. With regard
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to the nostrils, if there be any mechanical reasons why vapours, or steams producing the sensation of smell, should not have the same mechanical effect, they are not investigated ; but one is disposed to suspect that there is, because the sensations communicated by this organ are more apt to be weakened than those of most of the others.

It is not worth while to pursue this subject of mechanical diminution of sensibility to other parts of the body : but the mind certainly is also in many cases affected in such manner as not to be capable of receiving sensations, impressed with a sufficient degree of mechanical force upon the body ; since with regard to the feel, for instance, when an extremity is really colder, as when it has been made colder by immersion in cold water, an application of water of a less degree of heat than would otherwise have occasioned a sensation of warmth, would produce that sensation. Yet in the attack of a fever, such a degree of insensibility, with a feel of coldness, has in many cases taken place, that even hot substances
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have been applied in such manner as to coagulate, nay, perform the chemical analysis of the part, without any sensation of heat having arisen in the mind of the patient ; and on the other hand, the eye is so formed, that however its lenses may be flattened, or rendered more convex, yet a very tolerable image of a substance at some greater or lesser distance must be formed upon the retina ; yet sometimes, at almost the beginning of the attack of a simple fever, no impression is made upon the mind from such picture.

The faculty, therefore, of receiving impressions in the mind is also hurt in fever.

But sensation is again to be taken in two other lights, to wit, being distinct or indistinct.

It is an ordinary fallacy that the mind is capable of taking distinct impressions from the same picture made upon the eye, from the same vibrations of the fibrils of the ear, from the same impression of vapour, of steams on the nostrils, or of substances applied

plied to the tongue, or to the skin, or the other sensible parts of the body. It requires an exercise of the mind to receive such ideas distinctly. There can be no doubt but that a picture of an object may be painted equally on the eye of the rudest Indian, and the most polished of mankind, but it does not give the Indian the same distinct idea. But to avoid any thing that might be conceived to arise, from refinement of the passions, no one would contend that the Indian would be equally sensible of the difference of the flower of tormentil, and a tetradynamous plant of Linne with a botanist. In the attack of fever, this power of distinct sensation is diminished in all the organs of the senses: this is one of those things which renders it often difficult to a practitioner to get a clear and distinct account of what the patient actually feels. Perhaps this is a source of greater error in the description of fevers than any other. Many practitioners have conceived it was even useful to suggest feelings to patients which they had previously imagined they ought to feel in a disease. Many, with a laudable but mistaken view, have put the

patient in mind of a feeling that he may not have attended to, which the patient assents to. Some few perhaps to make a show to the by-standers of their being able to feel for the patient, or to divine his feelings. This has rendered the conception of the disease very erroneous.

The diminution of the power of sensation in all these ways is very various in the attack of a simple fever ; but this will be considered more fully afterwards.

At the beginning of the attack of a simple fever, sometimes as the very first symptom, a pain arises in the small of the back : it is rather a sense of uneasiness than acute pain. It seems to occupy the lumbar vertebræ, although it does not refer accurately to any particular part of the small of the back. It might even be considered as an affection of the muscles, and as arising from the depression of strength, in consequence of the want of sufficient power to sustain readily the weight of the upper parts ; but in fever this pain is equally felt if a man is in an horizontal posture, where the upper parts

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of the body are sustained by the bed on which the patient lies. It is extremely similar to a pain which takes place from weakness; but the pain or uneasiness which takes place in the back from weakness, is greater when a man is in an erect posture, whereas, in fever, there is frequently no difference. It is often the very first symptom which takes place, and even continues for an hour or two before any other arises; but it is also very frequently absent. The cause of this pain is not at all known. In dissection of patients who have died of fevers, in which this symptom was very considerable, nothing has been found in the part where the sensation was felt different from the appearances which take place on dissection of patients who have died of fever, where no such symptom was present, nor different from what has been found in patients cut off by many other diseases,

Diminution of secretion takes place along with these appearances in every part of the body. Diminution of secretion may arise from contraction of the vessels through

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which the secreted fluid flows from the blood vessels, or it may arise from want of sufficient force in those vessels which propel it through the secreting vessels. As the powers of the body are all oppressed in the attack of fever, it might be supposed that this diminution of secretion was owing to the depression of strength ; but then it is to be observed, that the secretions continue diminished when the next stage of the disease comes on, when the action of the heart and arteries is evidently considerably increased ; therefore it would seem most probable that it is contraction of the small vessels, through which the secreted fluid passes from the blood vessels into the cavity of the gland.

Along with these appearances, and sometimes at the very first beginning of the attack of fever, the tongue becomes covered with a crust of a very particular kind. At first it has frequently the appearance of an extremely viscid fluid just covering the upper surface of the tongue, but sometimes at the very beginning it is a solid crust of a whitish colour, adhering so firmly to the
tongue

tongue as not to be capable of being scraped off. In a simple fever, which is here described, the author has had no opportunity to examine it by dissection; but similar crusts formed in complicated fevers he has examined. This crust is solid, is so connected with the upper surface of the tongue as not to be capable of being separated from it by any dissection. Examined by a microscope, on making a transverse section of the tongue, it gives at first sight the idea of a number of little bags rounded at one end, and tapering off to a kind of stalk, much such an appearance as we see in cutting any of the fruits of the orange kind; but these are not bags containing fluids, but solid masses, having the same properties as the ordinary solids of the body, such as a muscular fibre, &c. when chemically examined. Similar crusts are formed in a great number of other diseases: this crust must be formed upon the surface of the tongue itself, for the masses of which it consists are vastly too large to pass through the excretory ducts of the glands, which open upon the surface of the tongue.

In a simple fever, which is now treated of, this crust is sometimes white, sometimes verging towards brown. When a slimy crust is formed at the beginning, the tongue is apt to adhere by it to the roof of the mouth, in some degree; but when the crust is solid at the very first, or when being slimy at first, it becomes afterwards solid, there is no more adhesion to the opposite parts than in the sound state of the body, and often not so much, as it prevents the secretion of fluids from the glands of the tongue, so that the tongue is drier than in its natural state. The under surface of the tongue, below the point, is hardly ever covered with this matter. The upper surface is often not covered with it equally; but generally when the covering is unequal in a simple fever, the edges and point are less covered than the middle, and towards the root. The membrane of the other parts of the mouth are not incrusted with the same kind of matter in a simple fever.

It happens at the beginning of the attack of the disease, that the patient has a sensation
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of some light body moving over the hairs which rise from the skin, as if, for instance, a number of little insects were walking over the points of these small hairs. This sensation we have hardly an English term to express; it has been called *horipelatio*. This appearance takes place generally at the very first beginning of the disease, when it is noted at all; for the great sense of restlessness, uneasiness and anxiety, drown the perception of it in the patient in many cases where it is actually present, and render it exceedingly difficult to determine how far it is a constant or very common symptom.

The colour of the skin changes often at the very beginning of the attack. The skin itself is colourless, or, in other words, white; the scarf skin is also colourless, but transparent. The blood flowing in the blood vessels is scarlet, that is a mixture of red and yellow; in the arteries the yellow is more or less lost in its passage through the capillary vessels into the veins; but when the circulation is going on, it retains a small portion of its yellow, even in the veins. On the whole, therefore, a colour

is given to the exterior surface of the body, by the blood circulating in the small arteries, capillaries, and small veins, which verges from a pure red to a tint of yellow ; so that the external surface of the body is what we call somewhat of a florid red, in as far as its colour depends upon the blood circulating in the skin, or perhaps even somewhat under it. Between the scarf skin and true skin, there are several membranes which are called together *rete mucosum*, of which there is one which is of a lighter or deeper brown, which is a mixture of red with a less proportion of yellow and blue than constitutes white or grey. This mixture is not always the same in different men ; sometimes it is such as to approach more to white, and sometimes to approach more to grey, and this governs what is commonly called the complexion in men. Besides this membrane there are numerous glands, which secrete a kind of oily matter of a dirty yellow, that is, a yellow somewhat contaminated by a mixture of red and blue. In the attack of fever, the colour of the skin itself is not altered, the transparency of the scarf skin is somewhat diminished, the colour acquired
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from the blood is very much diminished ; the colour of the brown membrane and the sebaceous matter remain and predominate, and give a dirty look to the external surface, which is very conspicuous.

At the same time another appearance takes place in the skin. By a common error in the human mind, it is apt to take up what first offers itself to us. It was long before it could be inculcated into rude nations, that the earth was not the centre about which the whole of the heavenly bodies revolved ; so on considering the bodies of animals, finding that the muscles, which are the principle agents in producing the motions of the body, consisted of fibres, it was supposed that a part, in order to be capable of contraction, must consist of fibres ; and as no fibres could be shown in the skin in the human body, it has been believed by many that the skin was perfectly inert, and incapable of contraction ; while there is no man, who was not blinded by his mind being pre-occupied by such prejudice, who has not daily evidence in looking at his own skin, of its being sometimes contracted, and applied to the
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muscles, and other parts under it, so as to press upon them with great tightness, and at other times loose and easily moveable; sometimes smooth, soft, and equal, at other times contracted in wrinkles. In the attack of fever, it is contracted in wrinkles, and applied closely to the muscles, and other parts below.

In describing the diminution of sensibility, that of the particular parts has been left to be considered along with the other alterations which take place in them.

The sensibility of the skin is very much diminished in the attack of a fever. Of this one great instance is its insensibility to heat, which has been so great in some instances, as not to impress any sensation on the mind, when hot bodies have been applied to it so as to coagulate the scarf skin, or even decompose the true skin, as has been observed.

This insensibility to heat is not from the sensation of coldness, which has been already described, for it extends to the sensations

tions of the skin of every kind. It is a degree of what is called numbness, or indistinctness of the ideas which are obtained by the feel of the figures of bodies; of their smoothness, or roughness, their hardness, or softness, &c. It is even extended to other applications that give pain as well as heat, as to pricking with sharp instruments, the application of stimulating substances, &c. The degree in which this numbness, or want of sensibility in the skin takes place, is various, but exists almost always more or less in the attack of a simple fever, and among the first appearances in the disease.

The eye in its appearance is also very much changed. Often at the very beginning of a simple fever, the exterior skin of the eyelids is affected in the same manner as the skin in the other parts of the body. The interior surface is not readily exposed to view; it is the exterior surface of the eye itself, and what can be seen through its transparent membranes which have been taken notice of. The exterior surface consists of the tunica albuginea, and retina, covered by
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the tunica conjunctiva, which is in itself very thin, perfectly transparent, and colourless. The eye may be divided, as in common language, into the white and pupil of the eye. In the white, the tunica albuginea is in itself of a white colour with somewhat too great a mixture of blue ; there run great numbers of blood-vessels ; many of these are visible to the eye, many others may be seen if we apply any magnifying apparatus to the living eye ; and we know from anatomical enquiries, that there are vast numbers too minute to be discovered by any means in the living eye. These carry blood of a florid, red colour, which influence the general colour of the white of the eye. Besides these, there are a number of glands which secrete either mucous, or sebaceous matter. The sebaceous matter is of a dirty yellow colour, like the colour of bile, and by many when predominant has been considered as actually bile ; every thing in the body, however, which is of this particular yellow colour, is not bile ; the wax in the ear, for instance, is not only of a yellow colour, but bitter in taste, yet it is not bile, differing from

from it in most of its other properties essentially. In the attack of a simple fever, there are fewer blood-vessels visible to the eye; the florid red makes much less of the general colour, and leaves the colour more to be governed by the bluish white of the tunica albuginea, and brownish yellow of the sebaceous matter, so that the white part of the eye is more obscure, or less brilliant than in health. The iris, as seen through the cornea, in the attack of a simple fever, is sometimes more contracted, sometimes more dilated than it is in the natural state of the body, but almost always it is less susceptible of contraction or dilation upon a larger or smaller quantity of light falling upon it; and the same want of disposition to contraction and dilation seems to affect all the muscles which govern the figure of the eye, for it is well known that the eye consists of several lenses which paint external objects upon the retina, but to form a distinct picture of distant and nearer objects, it is necessary that these lenses should be of different degrees of convexity, and there are muscles adapted to give them greater or less

less degrees of convexity, as objects at a greater or less distance are looked at; the eye is accordingly constantly changing its figure as it looks at more distant or less distant objects. These changes are very apparent, when the eye so changing itself is looked at, and the more particular the attention to any object, and the quicker this attention is executed, it is the more observable, and gives an idea of what is called acuteness in the eye. But on the attack of fever the muscles are not so ready to give it this change of form, so that it appears dull, and as if the patient was not attending to any particular external object. Further, it would seem, that in order to obtain a true picture on the retina, it is necessary that the eye should be directed to the object, and the quickness with which this direction takes place, also shows to the by-stander the attention of the mind to that object, and gives an idea of acuteness to the eye; but on the attack of simple fever, this quick change in the direction of the eye does not take place, and gives occasion likewise to an appearance of stupidity in the eye, in the attack of a simple fever; but

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moreover, even when the eye is not directed, by the mind's attention to external objects, to change its figure and position, when the mind itself is occupied with strong ideas brought up by the memory, the eye is apt to put itself in those positions, both with regard to its figure, and direction, but especially with regard to its figure, that it did when it received these distinct impressions; it often has an appearance of acuteness, as if it was actually adapting itself to receive these impressions,; but this does not happen in the attack of a simple fever; whether the inaction of the muscles depends upon their own depression of powers, or on the mind's not exciting them, or both, can, perhaps, be hardly determined; but the whole degree of appearance of stupor is, perhaps, very improperly apt to be ascribed to the mind, whose effusions are rendered more sensible from the eye than any other organ of the body; and those who have considered the mind as connected with the body by the brain only, have commonly considered this inactivity of the eye as dependant upon the brain.

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The whole secretory vessels throughout the body, secrete a smaller quantity of fluids. In the first place, the urine consists naturally of water, in which is dissolved a mucilage which is soluble in water heated to the heat of the human body ; but not soluble in water of a less degree of heat ; it, therefore, separates when the heat is less than that of the human body. In health the urine is transparent when first evacuated ; but upon standing to cool, it becomes cloudy, or deposits a sediment. But in the attack of fever, this substance is no longer found, so that the urine continues transparent when it has stood to cool. Since in all countries where we have descriptions of fever, the air of the atmosphere is colder than the human body, this difference has been always observed ; but whether it would take place where the atmosphere is of the same heat with that of the human body we do not know ; certain it is that the urine in health is rendered again transparent by heating it to the heat of the body. It may be that the secretory vessels of the kidneys are so contracted as not

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to let this substance pass through ; or it may be that it is not in the blood, but is formed in the kidneys in health, but not in fever. The quantity is so very small, not above a grain in a pint, even when the appearance of it is great, that it is impossible to detect it in the blood in health, and, therefore, this question cannot be determined ; but the contraction of the secretory vessels of the kidneys, during the attack of fever, is evident from the small quantity at that time secreted, as well as from its sometimes being of a paler colour. That the urinary bladder is also contracted in the attack of a simple fever is evident from the small quantity of urine evacuated at a time ; for if the bladder be much disposed to contract when a small quantity of urine gets into it, it is stimulated to expel it. There is a smaller quantity of fæculent matter evacuated from the intestines during the attack of a simple fever. The fæculent matter in the intestines consists partly of that part of the food which is not digested ; partly of the bile, and other fluids secreted into the intestines, which are not used during the digestion ; or if they are

used and decomposed, are not absorbed into the blood vessels. If a man has eat heartily before the attack of a fever, the food not being digested, in less than six or eight hours, it is either rejected by vomiting, or passes into the intestines, or remains in the stomach. First, the stomach does not act upon it, so as to make it go through the digestion necessary in the stomach, or to throw it into the duodenum, but sometimes it remains for several days in the stomach as the author has seen it rejected on employing an emetic, three, or even four days afterwards; but this cannot be the case in a simple fever which does not continue four and twenty hours: secondly, if it passes into the intestines, from the inaction of the intestines, from their depression of strength, it does not undergo the changes necessary to convert it into chyle, and therefore must pass forwards undigested; but the same inaction prevents the peristaltic motion of the intestines from going on, so as to carry it or the excrementitious parts of the fluids secreted in the intestines forward to the rectum, so as to

be evacuated. This is one cause of there being less evacuation during the attack of a simple fever. In the second place, there is a less secretion of the fluids which flow into the intestines, and in consequence less to be carried downwards, or to stimulate the intestines so as to encrease their peristaltic motion; from both these causes costiveness takes place. There is one exception, however, which must here be made, that if such nausea should take place as to produce vomiting, a much larger quantity of bile, pancreatic juice, gastric juice, &c. are often evacuated; but the author thinks these evacuations should rather be attributed to the second than to the first stage of the fever, as it never happens that a simple fever, or a paroxysm of an intermittent, is fatal, if vomiting takes place. The dryness of the skin, of the tongue and mouth, and the want of sufficient secretion in other parts, has already been noticed. If there be an ulcer in any part of the body, or a wound during the attack of a fever, it becomes dry, as the author has frequently observed, so that the vessels which throw out fluids,

even among the muscles, are also apparently contracted.

The contractions of the heart, and in consequence the pulsations of the arteries become more frequent in the attack of fever. It has already been observed, that the number of contractions of the left ventricle of the heart were very steady in adults in health, and very nearly 73 in a minute; it increases in the attack of a simple fever, but this increase is frequently not among the very first symptoms. The fever has sometimes come on, and continued for half an hour before there is any increase of the number of contractions; sometimes, however, greater frequency takes place along with the very first appearances; but this hardly ever happens without other symptoms of the fever being present at the same time. The frequency does not change all at once, but gradually from 73 to 74, 5, 6, and so on to 80, 90, as far as 100 at least. In a simple fever, which terminates in 8, 10 or twelve hours, it is rarely less than 100, and sometimes in the course of the disease rises to 130 or 140. In
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a simple fever, the frequency of the contractions is generally greater than it is in compound fevers, which is remarked at present, because practitioners being much more accustomed to see compound than simple fevers, may be apt to be impressed with the idea that too great a number of pulsations is ascribed to simple fever, the number which takes place in a continued compound fever being generally about 100 in a minute. But the varieties which happen in compound fevers are not, however, at present to be discussed.

It has already been observed, that greater frequency of the contractions of the heart was not in appearance absolutely necessary to constitute fever; accordingly, as it has just been observed, the fever may have come on some time before the frequency takes place. It is not certain, even that a simple fever may not prove fatal before the contractions become more frequent. Certain it is however that if a simple fever, or a paroxysm of an intermittent fever be fatal in the attack, the contractions most commonly become very

F 3 frequent,

frequent, even beyond what can be counted. This frequency of the contractions of the ventricle of the heart is certainly a part of the attack of the disease: when the frequency has once taken place, it never goes off again in a simple fever until the whole fever has gone off: it is otherwise in compound fevers not very uncommonly.

The number of the pulsations of the arteries depends almost always upon the number of the contractions of the ventricle of the heart, just as the number of contractions of the ventricle depend on the number of contractions of the auricle; for when the auricle contracts, it throws blood into the ventricle which distends it, and stimulates it to contract. So when the ventricle propels blood into the arteries, it distends them, and stimulates them to contract. The number of pulsations of the arteries, therefore, must depend in general upon the number of contractions of the ventricle. If they acted, not by a muscular power, but by their elasticity, this must always happen. But that the arteries act by a muscular power,

power, has been sufficiently proved by experiments and observations foreign to the present purpose. It may happen then, that an artery may contract by another stimulus, besides the distention produced by the blood thrown into it by the ventricle, and the number of pulsations of the artery, therefore be greater than the number of contractions of the ventricle, or the distention of the blood thrown in from the ventricle may not be sufficient to stimulate the artery to contract. Hence it happens, although very rarely, that the number of pulsations of the artery does not accord with the number of contractions of the ventricle,

From the contraction of the arteries being a muscular action, arise other varieties in the feel of the pulsations of the arteries, independant of their number ; for the arteries may not allow themselves to be dilated to so great a degree by the force with which the blood is thrown into them by the ventricle. In this case, the artery, although it be the same with regard to its elasticity, will feel larger or smaller in the attack

of fever. It feels generally smaller. This smallness may, however, arise likewise from another cause ; for the ventricle of the heart may be contracted at a time that the blood is thrown into it from the auricle, so as to receive blood in smaller quantity, and throw it out in smaller quantity, and in consequence distend the artery less, or it may contract more feebly, and so distend the artery less ; or, as has been said, the artery itself may resist the dilatation, and it would seem that all these things contribute to the arteries feeling smaller in the pulsation at the beginning of the attack. It is to be observed, that in those attacks of fever, which are fatal, the artery continues to feel very small, and feels smaller and smaller till the patient sinks. This smallness of the feel of the artery goes off very soon in general ; but that will be considered afterwards when we come to consider what happens after the the attack of the simple fever.

As has been said, if an artery only acted by its elasticity there would be no difference in its pulsations, excepting those which arose from
from

from the different numbers of contractions of the left ventricle of the heart, the quantity of blood thrown into it at each contraction of this ventricle, and the force and regularity with which the ventricle contracted : but many other sensations are given by the pulsations of the artery. These other sensations, indeed all the sensations arising from the pulse that cannot be measured by any mechanical instrument, as the frequency can be by a watch, but which we may judge of from the sensation itself, require practice in order to make the distinctions, although they should not be very nice, as it requires a practical eye to make distinctions in painting, and a practised ear in music. As, therefore, there must be something arbitrary in determining the different sensations given by the pulsation of the arteries ; they have been represented very differently by different practitioners, some making them very numerous, others very few. There is, however, one sensation which is very generally allowed, that of hardness, which seems to the author to be in the beginning of the contractions of the artery,

artery, and to be somewhat fimilar to the thrill of a large mufical chord vibrating. Others have defcribed it differently. This ftate of the arteries producing this fenfation gives a particular difpofition to the blood.

The blood confifts effentially of three parts, the red particles coagulable, lymph, and ferum. Of thefe the coagulable lymph, when extravafated, coagulates, and gives folidity apparently to the whole mafs of blood. After the whole mafs of blood is apparently become folid, there oozes out from every part of it a fluid, confifting of the ferum, the water that was contained in the coagulable lymph, and extraneous matters that are fluid or foluble in water. A folid mafs fwims in the middle, confifting of the mucilage of the coagulable lymph, and the red particles.

If blood be let flow from a blood-veffel into a bafon, fometimes the coagulable lymph coagulates almoft instantly. In this cafe, the red particles and coagulable lymph are blended very perfectly together, fo that
the

the coagulum appears an uniform mass. But if the coagulable lymph, or as is commonly said, the blood does not coagulate instantaneously, but continues fluid for several minutes, the red particles fall down from the surface, so that the blood divides before it coagulates, the upper part of it being a fluid without any red colour in it, but transparent and yellowish, and the lower part forms a red fluid. When the blood coagulates slowly, there is an upper crust, therefore, which has no red particles in it, and the lower part is a red solid, and when the serum oozes out, the coagulum has the appearance of being covered on the surface with a bluish or yellowish membrane.

The state of the arteries which gives their pulsations the feel of hardness, gives the blood a disposition to remain fluid for several minutes after it flows from the blood-vessels into a basin. That this is the case is proved by attending to the beginning of a pleurisy, acute rheumatism, or any other disease in which the pulse becomes hard soon after the beginning of the disease. If,
just

just before the pulse becomes hard, a vein be opened, and the blood be received into a bason, it coagulates immediately, and no crust is found on the surface of the coagulum; but if the pulse remains hard for an hour or two, and then a vein be opened, the blood will remain for several minutes fluid after it is received into the bason. It is, therefore, the state of the arteries, when their contractions give the sensation of hardness, that occasions the alteration in the state of the blood. If a vein be opened and blood be let flow from it successively into three different basons, and these be let stand until the coagulation, and extrication of the serum takes place, it happens frequently that the crust, which has been described, appears in the first bason, and not in the second or third; or it appears in the second, and not in the first or third; or it appears in the third, and not in the first or second; or it appears in any two of them, and not in the third. It may be, and has been said, therefore, that this appearance can show nothing, but is entirely vague. It has been said above, that the appearance of this
 crust

crust on the top of the coagulum is owing entirely to the blood's remaining longer fluid after it is received into the bason, and so giving time to the red particles from their gravity to subside from the top. There are circumstances in the figure of the vessel in which the blood is received in the manner and velocity in which it flows from the blood-vessel into the bason, which makes it sometimes become solid sooner or later, which is the occasion of this variety; but if the basons be of the same size and shape, and the blood flows into them from the blood-vessel with the same circumstances exactly, and the same velocity, such variety is never found. It would be too great a digression to describe these circumstances at present; it is only to be observed, that when there is a strong sensation of hardness, the disposition the blood acquires from thence of remaining longer fluid after its extravasation is so strong as to overcome these accidental causes of variety, and a crust is always found upon the coagulum. But when the state of the arteries which gives the sensation of hardness is not strong, then these

these external circumstances frequently overcome the disposition of the blood to remain longer fluid, and give the appearance of a crust on the surface of the coagulum.

The state of the arteries in the attack of a simple fever is such as to give a peculiar sensation to the finger during their contraction. The greatest part of authors and practitioners have called this sensation hardness; it, therefore, undoubtedly approaches near, or actually is the sensation of hardness; but it must be observed, that where there is this sensation strongly impressed upon the finger by the pulsation of the arteries in a simple fever, and blood is taken from a blood-vessel, and received into a basin, under all the circumstances most conducive to keep it long fluid before it coagulates, it nevertheless coagulates soon, and no crust is found upon its surface. This being the case, it is clear that it is greatly to be suspected that the state of the arteries, which gives this sensation to the finger, is not that state which gives this sensation of hardness, and the author thinks that he can determine the difference

difference between these sensations perfectly.

There is, therefore, another kind of sensation which takes place, if the finger be applied over an artery in a fever, to which the author gives the name of obstruction, he not meaning to impress any idea with regard to the state of any part of the body, but merely as a name to distinguish it from hardness. This state of the arteries giving this feel of obstruction, is constant in the attack of simple fever, and remains at least till the fever begins to go off. By what has been said, it is not meant by any means to say that hardness of the pulse does not happen frequently in fever, but it does not happen immediately on the attack. When hardness of the pulse takes place, it is a symptom produced in a stage of the disease, which is to be taken notice of afterwards: but hardness and obstruction are so little the same, that obstruction and softness are not at all incompatible; the more violent the attack, the greater the feel of obstruction.

When

When the attack of a simple fever is very violent, the pulse is not only frequent, small, and obstructed, but the heart and arteries are otherwise deranged in their action. Generally, as has been said, the times which the contractions take up are equal, but when the attack is very violent, they are sometimes unequal, and sometimes the time of a contraction is lost, then we say that it intermits. This inequality of the action of the heart produces an inequality in the action of the arteries, whose pulsations become unequal and intermitent in fever simple or compound, or in any stage of it; this is always a very dangerous symptom, excepting where it also took place when the patient was in health, and before the disease arose, but in the attack it is particularly hazardous.

When these things have taken place, and often at the very first appearance of the disease, pain arises in the head. Pains arise in the head in fever from different causes, and in different manners, but that which forms part of the attack is that which is be treated of.

Many authors have described this pain as depending on the state of the brain ; but in the author's opinion erroneously : its seat is most commonly in the forehead over the eyes, and feels to the patient as external ; sometimes it likewise occupies the back part of the head, with an equal external sensation ; sometimes it feels to the patient all round the head. It is a constant pain, inasmuch as it does not go off entirely, but varies sometimes in degree, although it gradually encreases, for the most part, as the attack goes on. It is not accompanied with any external appearance.

Most uneasy sensations are called pain ; they differ from one another, some being acute and pungent, some distensive, &c. But this is an uneasiness or pain which is accompanied with a sense of weight, and though often extremely violent, yet not acute, distensive, or sore, but resembling pain which arises from spasmodic contraction. It is encreased often very considerably by light falling upon the eyes. The same kind of pain takes place in hysteric

G affection,

affection, and other diseases. A kind of similar pain or uneasiness arises all over the body, which a patient often describes a pain in all his bones, not being able to particularize in what part of the body it is felt.

This pain affects the extremities. It differs from that soreness which takes place in the second stage of the disease, although it likewise continues often during the second stage, and goes all through compound fevers when their paroxysms run into one another. It occasions a great restlessness and uneasiness.

Delirium is a symptom which arises frequently in fever. Some have considered delirium as a disease of one species only; but the author thinks he can distinguish several different species which appear not to depend upon the same cause. Delirium is a derangement in the sensibility of the organs of sensation, and a derangement of the powers of the mind, and not uncommonly of the functions of the body. In its slightest degree, the sleep is attended with numerous
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and distressing dreams, which renders it unrefreshing. The patient, when he just wakes, is some time before he can attend to the impressions made on the organs of sensation. He does not know at first his bed, his bed-chamber, or his attendants for some minutes, but seems to awake, as it were, a second time, and becomes perfectly sensible. In a little greater degree the imagination is disturbed, and ideas float in the mind without train or connection, and rapidly ; unless his attention be strongly excited to some one object, he does not attend to the impressions made by the organs of the senses, but rather takes his ideas from memory than from the objects around him. If his attention, however, be excited, he is capable of distinguishing the surrounding objects perfectly. As the delirium encreases, the faculty of distinguishing the objects that are around him gradually diminishes ; he begins to talk incoherently ; a number of disagreeable ideas run now rapidly through his mind without any kind of connection. He is sometimes in a church-yard, sometimes falling from a precipice, sometimes wandering in an un-

known country, sometimes pursued by wild beasts, &c. An immense number of such ideas keep hovering in his mind; the disease still encreases; he becomes perfectly insensible to external objects; the evacuations take place involuntarily, and without consciousness; he has an uneasy feel in the skin, and in consequence picks the hairs, or rather attempts to pick the hairs from his bed-cloaths; he sees a number of blackish spots flying in the air, which he attempts to catch: even in this state the patient may recover. But when it comes to its greatest pitch, the swallowing and breathing come to be affected; when this is the case, he is almost always cut off. These appearances take place in all kinds of delirium, and that which takes place as a symptom of the first stage of fever, in a simple fever, is attended only by these appearances.

With these symptoms, a sense of weight, fullness and uneasiness takes place in the breast, sometimes tumour and hardness about the pit of the stomach. This anxiety and restlessness is totally different and independent

of that universal restlessness which takes place all over the body, already described ; they are frequently in very different proportions to one another, the feel of the one is very dissimilar to the sensation which the other excites. It is that kind of anxiety and restlessness which arises in grief, fear, and other passions of the mind, which is, at the same time, attended with paleness, and diminution of size of the veins, which are seen superficially. It would, therefore, be suspected to take place from more blood in the large veins pressing on the heart than could well pass through the lungs. In those dissections which have been made of patients who have died in the attack of a simple fever, the large veins going to the heart, that is the vena cava both superior and inferior, the right auricle of the heart, the veins of the lungs have been found distended with blood to a much greater degree than they are commonly, when death takes place from other causes.

Sometimes difficulty of breathing also takes place, and cough ; but this is by no means constant.

While these derangements take place in the other parts of the body, the stomach has particular affections in itself, independent of those which it has in common with the other parts of the system. Besides the sensations of taste, smell, hearing, and feeling, there are others which do not depend upon, nor are received from the mouth, nostrils, eyes, ears, or skin.

No language has ever yet become so copious as to express the varieties in the senses. Those sensations which we receive from other parts of the body than what are commonly called the organs of the senses, are expressed by the term we apply to the sensation received by the skin. We say, for example, that we feel hunger and thirst. Although we say that we feel pain, yet the idea held generally, is not that pain is particularly attached to the skin, or other organs of the senses, but that it is in various parts of the body. Hunger is commonly referred to the stomach. It does not seem, however, that it is always clearly an affection of the stomach. When the blood-

vessels

vessels have been greatly emptied, either by encreased secretions, or blood flowing immediately from the blood-vessels ; by want of sufficient nourishment in health ; by want of nourishment or wasting of the fluids during the progress of a disease : if the person should come into perfect health, and only remain weak, the appetite is generally very great, and even beyond the powers of digestion. The hunger, therefore, in this case seems rather to be an affection of the blood-vessels, a desire to fill themselves, than any particular affection of the stomach itself. On the contrary, when the vessels are very full, there is often no appetite, although the stomach is not in the least incapable of digesting a large quantity of food if thrown into it, without inconvenience. Although hunger, therefore, or want of it, is generally referred to the stomach, it may be doubted, in some degree, if it be an affection of the stomach at all times. It is not meant to be said by any means, that hunger can take place when the stomach is diseased, excepting in that disease, the principal symptom of which has been

considered as consisting in a voracious appetite.

In the attack of fever, the sensation of hunger not only does not take place, but if it was strong, the moment the attack begins, it ceases. The author has known several instances, where persons sitting down to table with a strong appetite; an attack of fever suddenly taking place; in less than two minutes have been unable to eat any thing, and have been seized with perfect aversion even to the smell of food. This aversion to the smell, or to the sight of food, or its even being mentioned, is often very strong during the attack of fever. What happens with regard to this in the other stages of simple fevers, and during the continuance of compound fevers, will be taken notice of afterwards.

Nausea likewise happens often at the first attack, and this is increased to such a degree, as to occasion vomiting. Commonly vomiting does not take place at the very beginning

ginning of the attack ; but the disinclination to food encreases gradually to nausea, then to vomiting, which in some cases is very severe, not only the contents of the stomach being evacuated, but likewise those of the duodenum, and of the glands, the secretory ducts of which open into it ; the principal of these are the ductus communis choledochus, and the duct of the pancreas. Bile, therefore, and the pancreatic juice are thrown up together, with the contents of the stomach, and the other fluids secreted into the stomach and duodenum. Of all these fluids bile is the most conspicuous from its colour, taste, and smell. This has often been observed by practitioners, while the gastric and pancreatic juices, and other juices secreted into the duodenum, as they are not very conspicuous from their sensible qualities, have not been taken into the account. It has often been supposed that the redundancy of bile constituted an essential part of the attack of fever ; whereas it is mere accident. If the pancreatic juice had been blue, and had any particular taste or smell, and the bile had been colourless, insipid,

fipid, inodorous, or as much fo as the pancreatic juice is, in that cafe, whatever has been faid of the redundancy of bile as an effential part of the attack of fever, would have been faid of the pancreatic juice. It is clear that no experiment hitherto made public has fhown that any bile was ever contained in the blood veffels, excepting in cafe of jaundice, and that, therefore, there can be no redundancy of bile, excepting as much as can be contained in the biliary ducts, and gall bladder. Much more than this is thrown out by twenty times in the attack of a fimple fever in half an hour. Therefore, the bile thrown out is a confequence of the ficknefs, exactly in the fame manner as it is a confequence of the ficknefs arifing from the agitation in a fhip at fea, and is not at all to be taken farther than as a mere accident in the attack of fever. The lofs of appetite encreafes, and the naufea and vomiting takes place fo instantly at the beginning of fever, that they can hardly be conceived otherwife than as an affection of the ftomach itfelf.

Thirft

Thirst we also express by the term, feeling; it is commonly referred to the mouth. Certainly, when the glands of the mouth do not secrete a sufficient quantity of fluid to keep the membranes moist, this sensation arises. Although the glands of the mouth may secrete their ordinary quantity of fluids, yet, nevertheless, a greater quantity of air passing backwards and forwards to the lungs, through the mouth, in speaking and breathing, so as to dry the membrane, excites this sensation. But thirst may arise when the membrane of the mouth remains perfectly moist.

When the membranes of the mouth are perfectly moist, if a large quantity of watery fluids should be evaporated in the form of insensible perspiration, or exude from the skin in sweat, or be otherwise thrown out by any of the excretory organs which commonly throw off watery fluids (as, for instance, in diabetes) great thirst ensues, although there does not appear to be any particular affection of the mouth. We cannot say, therefore, that an affection of the mouth is the cause

cause of the thirst, because the sensation may be as well produced by a simple want of water in a sufficient proportion in the blood-vessels; and thirst, from this cause, commonly produces a desire to drink whether the mouth is disordered or not. At the time of an attack of fever, the mouth may sometimes be moist, thirst, nevertheless, usually takes place. It frequently happens that attacks of fever come on when there is no reason to believe that the proportion of water in the fluids has been diminished, or is less than in the ordinary healthy state of the body; it may, therefore, proceed from affection of the stomach, for that this is capable of exciting thirst appears evidently, from that thirst, which often arises from salted food thrown into the stomach, while it certainly still remains there, or during the digestion of food used in too great quantity, or of difficult digestion. It would, therefore, appear that the loss of appetite, aversion to food, nausea, vomiting, and thirst arising in the attack of fever, indicate that the stomach is particularly affected.

This

This might be supposed to be owing to the depression of its powers. The powers of the stomach may not be sufficiently great to digest a great quantity of food, yet the appetite may not be lost, as is often seen in convalescence from fever; where it frequently is great, although the powers of digestion are weak. Thirst can by no means be attributed to depression of the digestive powers of the stomach. It may, therefore, be concluded, that there is also a peculiar affection of the stomach in the attack of fever.

Fever in its appearances as have been enumerated, shows in its attack; depression of the powers of the mind; of the sensibility of the organs of sensation; of the exertion, and disposition to be stimulated in the body; contraction in the vessels throughout the system, which being either confined to, or greater in the smaller vessels, occasions a larger quantity of blood to be accumulated in the larger vessels near the heart; together with some peculiar affection of the stomach. These external

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appearances in this disease, seem so very independent upon one another, excepting the quantity of blood accumulated in the larger vessels in consequence of the greater contraction of the small ones, that they can only be considered as some alteration of the system which has not hitherto been investigated, therefore, every thing that has been said relating to the essence of this disease has only been conjecture following wild conjecture, to which the author does not mean to add.

The fluids were totally unknown in their properties to the Greek and Roman physicians; every thing which they grounded upon their properties, or the properties of the solids, such as redundancy of bile, phlegm, blood, black bile, heat, and cold, moisture or dryness, was merely the phantom of their brain. Not but that their attention and accuracy in the history of the disease was extremely great. It is but very lately, and partly owing to the author's experiments, that the blood was known to consist of red particles insoluble in solutions of the neutral salts contained in the
other

other parts of the blood; coagulable lymph, a fluid coagulated on extravasation, which was discovered by Senac; serum, a fluid not coagulable on extravasation, but coagulable by heat, discovered by a student in anatomy, something more than two centuries ago; a solution of natron muriatum, ammonia muriata, and ammonia phosphorata, sometimes calx vitriolata, and calx muriata, a solution of putrescent mucilage, likewise water diffused through the other parts.

An attack of fever takes place when these parts of the blood are in various proportion to each other, as has been ascertained by experiment.

The red particles differ in their colour; in being perfect, or broken down into smaller or irregular shaped masses, which but rarely happens. The attack of fever takes place in any of these cases. The coagulable lymph sometimes coagulates immediately on being taken from a blood-vessel, sometimes it remains fluid for a few minutes, so as to allow the red particles to fall to the bottom

before it coagulates. It sometimes coagulates more firmly, sometimes more loosely; the serum sometimes separates more completely from the mass than at other times. Heat coagulates it sometimes more, sometimes less readily and firmly. In all these cases attacks of fever take place. There is, therefore, no sensible state of the fluids contained in the blood-vessels peculiar to it.

An imaginary being, such as the spiritus archeus of Van Helmont, or as imaginary an obstruction, such as that of Paracelsus and Boerhaave, cannot be taken as a ground on which to found the phænomena or the practice in fever.

Although contraction of the small vessels is a part of the external appearance which takes place, converting the Latin word contraction into the Greek word spasm, does not make it the essential part in fever. This term has been applied so variously that it gives no strict or defined idea. There are certain parts of the body which are capable of becoming shorter in one direction, inde-

pendent

pendant of their chemical or mechanical properties ; this shortening has been called contraction, it is produced by ideas of the mind, volition, or stimuli applied. When there is no appearance of any idea of the mind, volition, or the application of a stimulus, the moving part sometimes contracts ; this contraction has been called spasm. It has happened when a moving part contracts in consequence of an idea of the mind, volition, or the application of a stimulus, that the contraction continues long after these causes cease to act ; when it continues longer than the usual time it has been called spasm.

When any vessel has its sides shortened in the direction round the vessel, its diameter of course becomes less, and the vessel is said to contract. All the moving parts are contracted to a greater degree in a living body than they would be, were the body dead. This has been called the tone of the parts. This contraction is constant, but not always the same in degree. It is often greater or less without any alteration in the health. The blood-vessels are constantly pressing upon the blood in their endeavour to become

H smaller,

smaller, which they are prevented from doing by the blood contained in them. That this is the case is evident, for if any opening is made in a blood-vessel, blood is thrown out. It may be said, that the power which forces it out is that of the circulation, but the pressure of the sides of the blood-vessels must be equal to the force of the circulation, otherwise they would be distended, and enlarged to a greater degree, as action and reaction are equal and contrary. If the action of the powers producing the circulation be weaker, the blood-vessels, if every other circumstance be the same, will be smaller in their diameter ; or, supposing the force of circulation in a blood-vessel should be the same, if the tone of the vessel should encrease, the vessel will contract, and become smaller in its diameter ; but applications may be made to a part, in which the force of the powers of circulation continuing the same, and the tone the same, contraction in the vessels may take place in consequence of that application ; as when we apply astringents, for example, which act without affecting the chemical or mechanical properties of the part.

When

When the blood-vessels of a part, in consequence of any such cause, contract, and the cause is removed, it sometimes happens that the contraction goes off, sometimes continues.

A man sitting in a warm room shall have the blood-vessels of his hand of a considerable size ; if he puts his hand out of the window into the cold air, its blood-vessels will contract ; returning it into a warm air, they shall sometimes be enlarged again in a very short time, sometimes they shall continue contracted after this cause of contraction is removed : this has been called by some spasm. If the blood-vessels should contract apparently without any cause, the force of the circulation, and their tone remaining the same ; it bears an analogy to the contraction happening in like manner in the muscles, without any apparent cause ; and is also called spasm. As no effect, however, can take place without a cause, such contraction must arise from some cause, although it be not apparent. Again, there is a certain degree of regularity which takes place in the contractions of the various moving

parts, if it does not, the irregularity has frequently been called spasm. For example, in the peristaltic motion of the intestines, there is a regular motion takes place spirally downwards. If two rings should remain contracted some time, so as a vapour is confined between them; or if one ring should contract strongly, and press the interior part, so as to give pain; if either of these irregularities should take place, it is called spasm. Pains arising in any part of the body not referred to any apparent cause, as hemicrania, have been called spasm. The term has also been applied in a variety of other ways. Now the contraction which takes place at least in the small vessels, the appearances of which have been pointed out, if it can be called spasm, is of that kind where the vessels contract for some cause, and remain contracted after the cause is removed. But all the causes of fever do not apparently produce contraction, and contraction is by no means the only appearance that takes place in fever, and the other appearances are totally unconnected with it, as far as can be judged. It is, therefore, much more probable that this contraction is not the essential part of fever, but is produced

duced by the fever, continues as long as the fever which is its cause, and goes off when it is removed.

Others have taken the term spasm much more generally than in any one of these senses. That every preternatural motion, or affection of the system, which arose without any alteration in the chemical properties of the solids or fluids, or any introduction of extraneous matter into the system was spasm, under this definition, it would not, perhaps, be difficult to admit that fever was spasm, but for any purpose of understanding the history or manner of treatment of the disease, this would be useless.

Converting the Latin word contraction into the Greek word spasm, will not make the depression of the powers of the mind ; of the sensation ; of the exertion of the powers of the body ; or of the diminution of the susceptibility of being affected by external applications in the body, so as to excite motion, or produce rest dependent upon the contraction ; nor will it make the peculiar affection of the stomach dependent on it.

What, therefore, is the real derangement in the system which produces the external appearances in fever, it must be owned, is not at all known ; therefore, without attempting to make conjectures, we are to pursue the history of the disease as it manifests itself by external appearances.

The symptoms of the attack of fever which have been enumerated, however much they may be varied in degree or proportion, continue through the whole disease. The more numerous and violent they are, so is the fever itself more violent ; when they are all gone off, the fever no longer exists.

Fever then is a disease, the essence of which is not understood. It manifests itself by a depression of the powers of sensation, irritability, and action in the body ; and likewise of the power of memory, imagination and judgment in the mind ; with contraction of the small vessels throughout the body ; an accumulation of fluids in the large vessels ; and some particular affection of the stomach.

It may be a question, whether it be best to proceed to the description of the subsequent stages of the disease, or investigate the causes which produce it. The subsequent stages depend entirely upon the attack, and if the fever goes off, cease. Although these subsequent stages require much attention in the course of the disease; they are nevertheless no part of its essence.

The causes of diseases have very frequently been taken from hypothesis. It is not the author's intention to enter into metaphysical reasoning, yet precision of ideas has been so little attended to in medicine, where it is more necessary than in any other science or art, that he may be allowed to make the following observations. The mind can form an idea that an effect can take place without any cause; that, for instance, the Almighty existed from all eternity, with all his powers, without any cause. It is from experience alone the doctrine springs that effects have causes. We find when the beams of the sun touch

the atmosphere in any particular part of the earth, day-light begins to appear, that the light continues to encrease until they fall upon the earth in a perpendicular direction ; that as the sun descends the light diminishes, and when his beams no longer touch any part of the atmosphere in that part of the earth, day-light totally disappears. Of this we have constant and daily experience, therefore we are led to believe that rays coming from the sun, whatever they may be, are the cause of day-light. In this case, the reference of effect to cause depends entirely upon experience.

In treating of fever, nothing is to be admitted of as a cause, the knowledge of the action of which does not depend upon experiment. Our experience of cause producing effect rests entirely on one event happening, and another succeeding. It is no single event following another which can establish that the preceeding one is the cause of the other. If a noise produced by firing a musket should be heard, and immediately afterwards a man should

should fall down dead, it might strike the mind with an idea that the noise of the musket was the cause of the man's death. Still it ought to be considered as in the very slightest degree of probability, that this was the cause of his death, which might have happened in consequence of apoplexy. It is only from finding men dead frequently after the report of musketry, that musketry can be considered as the cause of death. If the report of many muskets was heard, and a number of men were found dead upon the spot from whence the noise seemed to proceed, we should immediately conclude that they had been killed by the muskets ; but although this had a considerable degree of probability, it might be erroneous, for the musketry might have fired at a review without ball, and the men might have been passing over a piece of ground where a large quantity of gas was rising up, without attending to their danger until they were suffocated. In the present instance, another very material circumstance must be adverted to ; it often happens that two concomitant effects take place from the same cause ; the noise of the gun, and the death
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of the man are both the effects of the discharge of the gun, but it is not the noise which is the cause of death. It may be supposed, that a person may never have seen a gun fired, but may frequently have heard the noise occasioned by it, and have seen a man drop down immediately afterwards ; his experience will have led him to believe that the noise killed the man, and have reached this person with an effect that did not fall upon himself, since he remained unhurt. It requires, therefore, an extreme great caution in assigning an effect to a cause, not to be deceived ; first, in believing that one thing happening before another that followed, the antecedent was always the cause of the consequent ; because the precedent may be accident, or they may both be concomitant effects. It may be thought superfluous to have made these remarks, but it must be considered that the author is not writing for metaphysicians, but for practitioners in medicine, not one in a thousand of whom ever thought of paying the least attention to the operations of the human mind. Of the number of causes to which

fever has been ascribed by the practitioners who have treated of fevers, few will bear the test of any strict enquiry. It is not worth entering into any refutation of many of these, but it is better to take a view of those causes which are most strongly marked.

The first to be noticed is infection. Fever has frequently taken place in a man who came near a person afflicted with the disease, although he has not touched him. It is very possible that this person so taken ill of fever after he had been near a person ill of fever, might, from some other cause, have been seized with the disease. For example, he might have been inoculated for the small-pox some time before, and the fever which took place might have been in consequence of that inoculation ; but by repeated experience it is now known, that although it very frequently happens that a man coming near another afflicted with fever, is not afterwards affected with the disease, yet it is well established, that of any number of men, one half of whom go near a person ill of this disease, and the other half do not go near
any

any one so diseased, a greater number of the former will be affected with fever than of the latter, in a short period afterwards. In some instances the proportion is not very different, in others, the author has known seven out of nine who went near a person afflicted with fever, seized with the disease in the space of three weeks afterwards. There is, therefore, a perfect ground from experience for believing, that coming near a person afflicted with fever is a cause of the disease.

The mind searches farther in this case : it will not be satisfied that the mere vicinity of a man afflicted with fever can be the cause of the disease, because it has no experience of vicinity having any effect excepting by attraction, and repulsion. The universal belief, therefore, has been, that there is some matter rising from the body when afflicted with fever, which, being applied to the body of another, gives occasion to the disease in him.

If it be any such matter, it is perfectly incapable of being discovered by any of the
organs

organs of the senses. Where a man is afflicted with the most infectious fever, if he be in a clean room, with clean bed-cloaths, neither the eye, the taste, smell, or feel give the smallest notice of there being any infection present. It is true, indeed, that a felon coming out of a dirty goal spreads noxious vapour very sensibly, and very fatally, but the author has often experienced both in St. Thomas's Hospital, and in other places, that patients have lain ill of fevers very infectious, and from whom infection has been actually received, so as to produce the disease in other persons, where there was no peculiar smell or taste, nor any thing sensible to the eye in the atmosphere surrounding them, or to the feel.

Although this infectious matter is not sensible, that there does arise some matter from persons in fever, is farther rendered extremely probable, as a person coming from a man afflicted with it into another room, where there were persons in health, some of these have afterwards been seized with the disease; sometimes several, as the author has known instances

instances of. A peculiar matter, therefore, is generated in the body of a man in fever, which is carried by the atmosphere, and applied to some part of the body of a person in health, and causes fever to take place in him.

This matter has been supposed by some incapable of communication by other means than by the touch of some part of the body. That this is not the case is most certain, from the author's experience, for he has seen several persons affected who only accidentally came into the room where the patient lay ill, without coming near him, or touching any thing in the room, excepting the floor with the soles of his shoes.

The other properties of this infectious matter are not at all known, as its existence is only known by its effect in producing the disease. No chemical examination of any of the fluids or solids of the body has ever shown its existence.

This infectious matter is produced by all fevers whatever. However, as far as the
author

author knows, no person has been seized with fever in consequence of coming near another afflicted with it, where the fever consisted of one paroxysm only.

That intermittent fevers produce this matter, or in other words, are infectious, the author knows from his own observation as well as from that of others. But intermitting fevers are not nearly so apt to produce it, or at least to propagate it as continued fevers, and the more violent the continued fever is in its febrile symptoms, the greater quantity of infectious matter is produced.

When a number of persons live in a small space, supposing even that they are kept as clean as possible, it happens frequently that fever arises in some, often in many of them. It has been in this case supposed, and is extremely probable, that some peculiar species of matter is produced capable of producing fever, on being applied to the body. If the air in such place be not frequently changed, the quality of the infection
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and its power are greatly encreased, and become often extremely fatal.

This source of infection is not peculiar to the human species. If a number of sheep be confined in a small space without sufficient circulation of air, an infectious matter is generated, which produces fever in them. Fevers also arising in these animals occasion the formation of infectious matter. Of this the author had an opportunity of being well acquainted with during the American war, when live sheep were attempted to be transported from England to America, and it was necessary to confine a number of them together in one ship. Although they were selected from flocks in perfect health, where they throve at sea perfectly when taken in small numbers to serve for fresh provisions for the officers, yet in many of the ships where numbers were confined, an infectious fever arose, even before they quitted the harbour. Whether it be that sheep are more subject to produce infectious matter when many of them are confined together,

or

or that it more frequently happens that many of them are oftener confined together in a small space, without sufficient ventilation, than quadrupeds of other species : infectious matter is much more commonly generated in them than in any other quadrupeds that are known.

Live hogs were also attempted to be exported in the same manner, and infection was produced among them, although not so frequently. It would appear that the infection which produces fever, either arising from fever itself, or from numbers confined in a small space, in one species of animal, is not capable of producing fever in another species ; for it happened, that when one side of a ship contained sheep, the other hogs, that if a fever broke out among the sheep, the hogs were not affected ; and that when fever broke out among the hogs, the sheep in many cases were not at all infected, neither were the crews at all affected, being as healthy as the crews of other ships making the same voyage, loaded with different commodities.

The infectious matter produced by a number of men living in a small space, as well as that produced by fever, may adhere to a person in perfect health, so as to be brought into another place, and communicate the disease to a great part of a whole assembly, as has been too often proved by a felon brought from goal into a court of justice, and infecting almost the whole of the persons assembled, and that even when the felon himself was perfectly free from fever, and never had been affected by the disease.

It often happens when numbers of persons are confined together in a small space, that putrescent substances are not thoroughly cleared away; hence, a person, brought out of a goal where putrescent substances have been accumulated, carries with him substances of a peculiar smell. Hence, some have supposed that the infectious matter produced in this last way had sensible qualities. This is, undoubtedly, not always the case, since infection has arisen from a person brought out of rooms in which numbers had been confined for several months,

months, but kept clean from all putrescent matter, so that there was no particular smell, or any sensible quality. In one case that came under the observation of the author; a person under such circumstances from whom no peculiar smell arose, or any other sensible effluvia, communicated the infection to four others, with whom he was carried in a coach for about half a mile, so as to produce fevers in all of them, which fevers were violent and fatal.

As, therefore, neither the infectious matter produced in the body of a man afflicted with fever, or produced by a number of men living for a certain time in a small space, have any other sensible quality but that of producing fever, it cannot be determined whether it be one species of infectious matter or different ones.

The vapour or other matter which arises from putrifying bodies, either animal or vegetable, being applied to a person in health also occasions fever. From putrifying substances, we know that there arise gas, in-

flammable air, and a vapour, resembling in its smell what has been sometimes called hepatic air. It does not appear, however, ever to have happened that fever has arisen soon after the application of either of these vapours, when produced in other ways; as for example, when gas arises from the earth, as it does in the caves near Pyrmont, or when it has been detached by acids from calcareous substances, it has never produced fever. Neither have men exposed to inflammable air set loose in dissolving metals in acids, nor when hepatic air has been extricated by acids from *hepar sulphurus*, or when it has arisen from the earth, been affected with fever more than under any other circumstances. It would not, therefore, appear that it was either of these vapours produced during putrefaction, which give occasion to fever. Whether, therefore, it be the same matter rising into the air from putrifying substances with that which is formed from a number of persons living in a small space, or in the body of a person labouring under a fever or not, cannot be determined. Certain it is, that the infectious matter which is thrown into the

atmosphere from the body of a person infected with fever arises often without the smallest appearance of putrefaction in the body of the man so affected, either in the appearance of the blood, of the solids, or any of the secreted fluids, although it be true that it happens, not uncommonly, that very evident appearances of putrefaction take place in fevers, which are very infectious, yet in a great many fevers that are so, there are no appearances of putrefaction. It is also true, that if a number of persons live in a small space, if care be not taken to remove all kinds of putrescent matters, fevers will arise much sooner, and more frequently; yet if the utmost care be taken to remove all putrescent matters, fevers will nevertheless arise. It would, therefore, seem probable that either the cause of fever, consisting of matter produced in the body of a person affected with this disease, was different from that produced by putrefaction, or might be generated without any putrefaction taking place, and that the matter capable of producing fever, generated by a number of persons living in a confined situation, was different

from that occasioned by putrefaction, or that it might be generated without any putrefaction taking place.

Infectious vapours produced in these ways occasion fever simply, which may, and often does go through its course without any disease necessarily happening afterwards. But there are other infectious matters which necessarily give occasion to another disease after the fever has taken place.

The first of these to be noticed is variolous matter. This matter, in as far as experience has shown us, has never been originally produced since the disease became known to Europeans from Asia, when the greatest part of it was under the dominion of the Abassides. If mankind had one origin, undoubtedly, it could not have existed from the beginning of the world, otherwise it must have descended to the Greeks and Romans, who, undoubtedly, were not acquainted with the disease. The probability of its arising originally at any one period of time, or any other, is therefore, exactly

ally equal. The Romans were well acquainted with all the parts of Africa, Egypt, Arabia, and Asia, which were under the dominion of the Abassides; therefore, certainly it did not exist in, and was not brought from any of those countries. It is more probable that it was first generated in Asia, during the reign of that dynasty. There is some suspicion of one other source. It might have existed in, and have been brought from, Indostan. It is singular that such a disease should be so little noticed in a country, with which not only England, but many other European nations have had so much connection. The reason is, that all infants are inoculated by a set of itinerants, whose sole business it is to traverse the country for that purpose. Although, therefore, the Greeks and Romans had some intercourse with Indostan, they might not, more than ourselves, have observed, or been infected with the disease. Variolous matter has its infection, like the infection produced by fever, confined to the human species. Whether other similar infections exist among other animals has not been ascertained. Va-

riolous matter is capable of producing fever applied floating in the air to some part of the body which has not been ascertained. Some have contended, that it was necessary the matter should touch some part of the body by some substance covered with it being applied to it, and not floating in the air. But in the first place, the author has known several persons infected, certainly without any such contact; even persons going into a room where the patients labouring under small-pox were confined, have brought the variolous matter adhering to their cloaths, or persons, into another place, where persons who never had been affected with the disease were, and have communicated the infection without contact. Moreover, the author has rubbed variolous matter upon the skins of persons who have never had the disease, where there was no wound without producing the disease in that person. If variolous matter be applied to the nostrils in a fluid form, the disease will frequently be produced. If the scarf skin be raised by the smallest puncture, and variolous matter be applied, the fever will ensue. When variolous

lous matter produces the disease, the fever does not arise immediately, but when it is applied, by making an opening through the scarf skin, or deeper, an inflammation takes place, and a suppuration ensues. As soon as this operation is completed, which is on the seventh or eighth day, the fever comes on. When the matter is applied, floating in the air, it is generally about fourteen days before the fever is produced. When any pustule is formed from applying variolous matter in a fluid form to a puncture, made so as to penetrate the scarf skin, or deeper, such matter is capable of propagating the disease. The quantity of matter so applied is certainly not necessarily more than the 1000 part of a grain, probably not more than one of a great many millioneth parts of a grain.

Another matter to which all the observations may be applied that have been made with regard to variolous matter, is that which produces fever followed by the measles, excepting that it seldom happens, although sometimes that the introduction of it into a wound

wound penetrating the scarf skin produces fever.

There are other such matters producing fever, followed by what has been called chicken-pox, swine pox, &c. which are much slighter diseases, and have not been well defined.

Another kind of infection which produces fever is that which produces the plague in Syria. Every disease which has, in a short time, been very fatal to a great number of the inhabitants of any country has been called the plague. A fever, for instance, accompanied with a dysenteric affection at Naples. A remittent, upon the Euphrates, as described in the Transactions of a Society for Promoting Medical and Chirurgical knowledge, in London. That which takes place in Egypt and in Syria, and of which a clear description has only been given by Dr. Ruffel, arises certainly from an infection of a particular species. It cannot be gathered from the accounts whether this may be originally produced without having
been

been propagated as the first class of infections are. It is followed most frequently, if not always, by inflammations of the lymphatic glands. This infection has sometimes been brought into Europe, as was the case at Marseilles ; but that disease called the plague, which ravaged this country, on considering the histories of the disease, seems to have been a fever, produced by infections of the first class which have been enumerated. For the inhabitants of this country, it is undoubtedly a matter of great moment to decide this point, but it would make too great a digression. The author may, perhaps, lay the evidence before the public in an appendix.

All and every kind of infectious matter capable of producing fever, or any other disease, by floating in the air, and being applied to some part of the body, is capable of chemical combination with the vapours that constitute the atmosphere. In this as in all other chemical combinations that are perfect, the properties of the elements are lost, and new properties are acquired. The atmosphere

mosphere is found to consist of various vapours, of which air, or as it has been called pure air, or respirable air, forms at présent about a fourth. Gas forms some part, but the greatest part consists of one or more vapours, which without any positive quality, but from that indolence, which makes mankind in their researches attempt to find a resting place, have been considered by many chemists as one individual species, under the names of phlogisticated air, &c. which, of these vapours that constitute the atmosphere, unite with the infectious substances creating diseases, is not known. If it were not for this combination, those infections would soon spread desolation over the whole earth. How far a quantity of infectious matter may be carried without being combined with some of the vapours constituting the atmosphere is not known: certainly not to a great distance. It appears pretty clearly, that the infectious matter of the plague cannot reach more than twenty or thirty feet, since men may converse with those afflicted with the disease at that distance with perfect safety. Variolous matter seems capable of reaching farther,

farther, since there is an instance where soldiers passing through a town in which there were patients in the small-pox being affected, although they passed through the middle of a broad street with celerity, in order to avoid the infection, were infected. It, however, is not to a very great distance that it can reach without combining with the air, so as to have its properties destroyed. The distance depends, undoubtedly, partly upon the disposition of the atmosphere; not only the infectious substances floating in the air capable of producing fevers, and other diseases; but likewise the essential oils rising from vegetables, and vapours of other kinds, which affect the sense of smelling, are so combined with air as to lose these properties before they reach that distance, where they should be so diluted as to become insensible. If the air be loaded with moisture, they reach to a much greater distance. Vapour arising from a field of beans, for instance, or a putrid ditch, is sensible to the nostrils at a greater distance if the air is moist. Hence it has been conjectured that those infectious substances which float in the air, producing fevers, and
other

other diseases, may also be carried farther when the atmosphere is loaded with moisture. But this has not been determined by any accurate experiment. It is hardly worth noticing the superstitious idea, that meat raised up into the air would putrify, and other things of the same sort, founded on no ground of experiment.

There are many infectious substances which float in air, or may be applied to the human body otherwise, which produce diseases of a particular part, occasioning affection of the whole system; that has often been called fever; but these affections of the system are by no means the disease the author describes under that name. The matter which produces the erisipelitous fore throat, called the putrid, or fore throat attended with ulcers, &c. is a matter which, rising from a person afflicted with that disease, communicates the disease to persons not affected. The disease produced in this case is an inflammation of the mucous membrane in the throat, and likewise sometimes in other parts of the body. In consequence of this, an
affection

affection of the whole system takes place, which depends entirely on the disease in the mucous membrane ; when this ceases, the affection of the system ceases likewise. Although, therefore, this affection of the system has many appearances similar to those which arise in fever, yet they differ most essentially from this disease.

In the smallpox, if the infectious matter be applied to a wound, an inflammation is produced in that wound, in consequence of which a fever arises. If the poison of a bee be infused into a wound made by the sting of the animal, or if the poison of any other animal be injected into a wound by its sting or tooth, an inflammation arises in the part where the wound is made, and that inflammation produces affection of the whole system, some of the symptoms of which may be similar to fever, but which are not the disease intended to be described here by that name. It might happen that a great inflammation might be immediately produced in a wound, into which variolous matter was infused ; that such an inflammation may produce

duce affection of the whole system in a day or two afterwards ; yet that affection is by no means to be called fever ; the fever which takes place being only induced after the supuration of the wound is complete, which is on the seventh or eighth day. It is also to be observed, that when, in consequence of a fever produced by infectious matter, some topical inflammation arises, and the fever is carried off by it, that such topical inflammation, as in the small-pox, produces affection of the system, in which some of the appearances are similar to some of the appearances which take place in fever. Such affection of the system has frequently been called fever. In the small-pox, for instance, such affection has been called secondary fever, although it in no way has any thing of the essence of this disease.

. It happens likewise that fevers not produced by infectious matter of any kind give occasion to inflammation, and that inflammation produces affection of the system, which has been called by some authors fever. This will be considered fully afterwards.

What

What the author has been endeavouring to inculcate at present is, when infectious matter produces any topical affection, and that topical affection produces affection of the system, which depends entirely on the continuance of the topical affection, so that the affection of the system disappears or begins to diminish, and gradually goes off as soon as the topical affection ceases ; such affection is not the disease described in this treatise under the name of fever.

The next cause producing fever, is sudden exposure to cold. It happens, undoubtedly, that infectious matter may be applied to the body so as to produce fever, and it may be some time afterwards before the fever arises, but the author is not disposed to allow that sudden exposure to cold occasions fever to take place, unless some symptom of the disease appears immediately. It must be observed, however, that it is not necessary when a fever arises from any cause, that a compleat attack of the disease should take place at once. It often happens that some slighter symptoms appear, and continue for several days, before

a compleat paroxysm takes place, or the fever can be said to begin; as will be afterwards explained. When a man, for instance, is exposed to putrid vapour, it happens frequently that head-ach, languor, loss of appetite, and restlessness take place, and continue for two or three days, or even a much longer time, before a perfect paroxysm comes on.

A distinction at present wished to be made is, on the one side, of the three first kinds of infection; viz. that which is produced in the body of a person afflicted with fever; that which is produced by many men living in a small space; and that which is produced by putrefaction; between these and variolous and other matters producing eruptive fevers, and perhaps pestilentious matter on the other side; there is this difference, that when symptoms of the first stage of fever, such as head-ach, languor, &c. takes place from the first class, they frequently go off again without any fever ensuing; but if they take place from the second class, whether they continue or go off, the fever certainly ensues.

When

When these partial febrile symptoms arise from infectious matters, they frequently occupy only some part of the system at first ; continue for a greater or less time, without forming a perfect paroxysm ; go off suddenly, or slowly ; or after continuing some time, all at once bring on a compleat attack of the disease.

The mind of man is so much impressed with the idea of referring effects to causes, that it will not be satisfied without resting itself upon some cause. Sudden exposure to cold produces diseases so frequently, that when persons, at least in this country, are seized with disease, and cannot remember any thing which happened out of their ordinary course of living, they rest on the idea that they have caught cold. But if a man had been suddenly exposed to cold, and continued in perfect health for four and twenty hours, the author would never allow that fever, or any other disease, was owing to it. A person may have come near another in very violent fever without catching the disease, so he may be suddenly

exposed to cold without having fever produced in consequence, We know that in Russia, as well as in other parts of the earth, men out of an heat of at least 160° of Fahrenheit's thermometer, plunge themselves suddenly into snow or water cooled to the freezing point, without fever or any other disease being the consequence. Some practitioners of great eminence have believed that sudden exposure to cold never produced fever, or any other disease. A rule of evidence must be applied here which has already been taken notice of, that a person may be exposed to a cause of disease without catching it, that every person exposed to the air near a patient afflicted with fever is not seized with the disease, yet a greater number of those exposed to it are seized with the disease, than of those who did not come near persons afflicted with fever; nevertheless this is a sufficient ground for believing that such exposure is the cause of the disease. So if a greater number of persons suddenly exposed to cold have been seized with fever, than others who were in other respects in the same circumstances; it is a ground sufficient to establish that sudden exposure to cold is a cause of this

this disease. But the evidence is much stronger in this case than in that of infection, because the author has seen many instances, where, from the exposure to cold, the commencement of the disease was instantaneous, and many are to be found on the records of medicine. The author assumes that this cause only operates when its effects are to be immediately observed, either as instantly producing the disease, or such symptoms of it as afterwards spread over the whole system, so as to make a compleat attack; for, as has already been observed, when a cause of fever is applied, it happens not uncommonly, that head-ach, languor, and other symptoms of the attack, or first stage of fever take place, and continue for some days, as far even as fourteen, from the author's observation, before a compleat paroxysm has been formed; but this will be discussed more fully afterwards,

The feel of heat or cold by no means indicates the real temperature of the atmosphere. This is a subject so well understood that it is sufficient to observe, that by sudden exposure to cold is meant the going out

of a warmer into a colder medium, whether it be the same, excepting as to its temperature, or different in substance. For example, if it be going out of the air of the atmosphere into the same air, only of a lesser temperature, or going out of warm air into cold water. It is not of consequence that the change should be from one particular degree of heat shown by the thermometer to another. If, as it is not uncommon for several weeks together in the interior parts of Africa, the temperature of the atmosphere be at 130° of Fahrenheit's thermometer, and a person was brought from that heat suddenly to one of 100° , that, the author believes would be sufficient exposure to cold to produce fever, although he has no instance of this having actually happened, there having been very little intercourse between this country, and that part of Africa, or any other where the heat is continued of any thing near that temperature for any considerable length of time. The instances are numerous where the heat is 100° , of fever being produced as well as various other diseases by a sudden diminution of heat to 80° ,

80°, and the author has known instances of fever produced by going suddenly from an heat of 60° to 40°.

Sudden exposure to a colder medium is apt to produce many diseases besides fever. It would seem that a sudden diminution of the temperature of the medium to which a person is exposed when the thermometer shows an high temperature of heat is most apt to produce fevers, and this seems to be one cause why fevers are more frequent in warm than in cold climates ; the sudden diminution of the heat of the medium being more apt in colder climates to produce catarrhs, rheumatism, &c. Why this happens is not attempted to be explained, as it is meant in this treatise to adhere entirely to a relation of observations and experiments.

Supposing a person were to pass through a column of a warm atmosphere not an inch in thickness, and immediately again into an atmosphere of the same temperature he was in before, undoubtedly no fever would be produced. It is necessary, therefore, that

he should remain some time in the warm atmosphere before his going into a cold one is sufficient to produce the disease. The heat of the atmosphere must put the system into some state, that the sudden exposure to cold may act upon it so as to occasion the disease. The obvious effect of remaining in the warm atmosphere is to produce a greater circulation in the exterior parts of the body, greater evaporation into the atmosphere, and a greater exudation from the skin. The obvious effect of exposure to cold is to produce contraction of the exterior vessels, of course, that a greater quantity of blood should be contained in the interior vessels, that there should be less evaporation from the body generally, and less or no exudation from the skin. Sudden and slow exposure to cold produce these effects equally, therefore it cannot be from the simple contraction of the exterior vessels, the simple diminution of vapour rising from the body, or the simple diminution of the exudation from the skin that the mischief arises ; for it is certain, that gradual diminution of the heat of the medium has never been observed to produce fever,

fever, or, indeed, any other disease. All other conjectures about the mode of sudden exposure to cold producing fever are so extremely nugatory as not to be worth the least notice. That checking the insensible perspiration, or producing contraction which has been called spasm, or by any other term, is the cause of sudden exposure to cold producing fever has been much received, and, perhaps, might require fuller discussion, were it not that contraction, and obstruction of the insensible perspiration may be equally produced by slow as by sudden exposure to cold, and without any mischief, which the author thinks sufficiently refutes this doctrine, especially as when a fever is actually produced it is independent entirely of its cause.

All the advantage which arises from the knowledge of the causes of fever, is the prevention of the disease, and this accounts for the slovenly manner in which authors have treated of its causes.

In

In order that sudden exposure to cold should produce fever, it is not necessary that the whole of the exterior surface of the body should be exposed to it. It is sufficient that a cold substance be applied to part of the surface, or that a cold fluid should be thrown into the stomach. It must be observed, however, that although there are many instances of cold being applied partially, or of a cold fluid thrown into the stomach producing fever, yet a partial exposure of cold is more frequently followed by other diseases, especially internal inflammation, as pleurisy, &c. and farther, sudden exposure to cold is followed, perhaps an hundred times or more by other diseases, for once that is followed by fever. If a man, when fatigued, is suddenly exposed to cold, the exposure is much more frequently followed with disease, and particularly by fever. For example, if a man has been in a crowded assembly, where his attention has been strongly excited, and comes suddenly out into the cold air; or, if he has been fatigued by exercise, if he should throw himself into cold water, there are many instances of fever having immediately ensued.

ensued. It does not appear from any well attested evidence, that fatigue encreases the powers of any of those substances which, floating in the air, and being applied to the body, give occasion to the disease.

The next cause to be taken notice of is moisture. A man going into water of a moderate temperature, and remaining in it for some time, has not been found more frequently afterwards affected with fever, than after standing, walking, or any other indifferent circumstance. It is certainly, therefore, not the application of water to the body that gives occasion to the disease, but if the air has particles of water floating in it, and a man has continued for some time in such an air, fever has ensued much more frequently than when he had lived in a dry air. It is to be observed, that water may be in the air in three different ways. Small particles of water may be suspended in the air like any other matter reduced to very fine particles; for, although water be of greater specific gravity than the vapours which form the atmosphere, yet many other substances

stances of much greater specific gravity than water are frequently seen suspended in the air. This is easily demonstrated by allowing a small portion of the rays of the sun to pass through a small hole into a darkened chamber, these particles are at all times discernable. The air, although of small specific gravity, is exceedingly viscid, and, therefore, if particles of any matters are blended with it by any power, they will fall down very slowly, or if there be any agitation will be altogether suspended, and the atmosphere is almost always agitated with various currents. A solution of gum arabic in water is not of much greater specific gravity than pure water ; but while small particles of sand, clay, &c. sink readily in pure water, yet they they will be suspended a long time in a solution of gum arabic, in which, if there was any considerable agitation, they would not sink at all. It is not necessary to say how these small particles of water are thrown into the air.

When these particles are found in the atmosphere, they maintain all the properties of

of water, moisten substances, so as to lengthen or shorten them according to their texture, and the quantity of the particles of water may be ascertained in some degree by an hygrometer, an instrument commonly measuring the lengthening and shortening of substances.

Secondly, of the vapours which constitute the atmosphere, some one or other, or all of them are capable of combining with water chemically, so that the properties of these vapours and the water are lost, and the water so combined does not affect substances so as to lengthen or shorten them, nor does it disturb the transparency of the atmosphere, which water suspended in the atmosphere in the manner first described does, and is often extremely sensible to the eye without any aid, but much more perfectly if objects are viewed at a distance through a telescope of great magnifying powers. If the atmosphere is hot or dense, it is capable of combining chemically with a larger proportion of water. If it should be saturated with water, therefore, in any particular degree

gree of heat or density, if the heat or density should be diminished, it is separated, and mixed with the atmosphere in the first manner, as is easily observed. If the weather should become suddenly very warm, and the heated air should be made to pass through a large building, the walls of which have not had time to acquire the heat of the atmosphere, the water is not only condensed upon the walls, but the atmosphere of the building loses its transparency, and appears very moist by the hygrometer. Thirdly, if the vapours constituting the atmosphere should be heated to a degree equal to that in which water boils, which differs, according to the pressure on its surface, in that case, after the atmosphere had dissolved as much water as would saturate it, the remaining part of the water would not be in small fluid particles, but in the form of vapour, and would mix with the other vapours of the atmosphere exactly as they are mixed with one another. As soon as the heat should be so diminished, as to be less than that which water would boil at with that degree of pressure, then the water would return to its

fluid form, and be suspended in small particles. Of these three different modes of suspension of particles of water in the atmosphere, the first only has been called moisture, and it is this only which has been found to occasion fever. It is true, that if water be contained in the atmosphere in either of the other states, it may easily be reduced to this by the means that have been already stated.

Some have contended that the application of water suspended in the atmosphere in the form of moisture did not produce fever. If those who have held this doctrine were to live a year or two in Batavia, they would be convinced, by fatal experience, that men living in a moist atmosphere are more frequently affected with fever than in a dry one.

Men wearing any moist covering have been more frequently affected with fever than those who have worn cloaths not moistened with water. Vast numbers of men have worn moist cloathing, and have lived in moist
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atmospheres without any fever having taken place immediately afterwards. Hence, many have conceived that these were not causes of fever. But the observation of so many men being immediately seized with fever, as well as other diseases, after being exposed to moisture, more than in those who have worn cloaths free from all moisture; the other circumstances being the same, both recorded in the annals of medicine, and that have come under the author's inspection, give as full evidence that moist cloaths are capable of producing fever, as any that can be generally procured with regard to the causes of diseases.

The frequency of fever immediately following a person's having been covered with moist cloaths, is not the same indiscriminately, whatever substance, or texture they are of. There are some substances, and certain textures which conduct heat and cold more readily, that is, on being brought near an heated body, receive heat from it more readily, or more slowly. A piece of lead, for instance, placed near an heated body
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will acquire the heat of that body sooner than a piece of chryſtal, or cold if it be placed near a cold body ; all other circumſtances, excepting the ſpecies of matter, being made equal. Wool, although the ſubſtance be the ſame, if it be wove into a looſe cloth ſuch as flannel, will become hot or cold more ſlowly, if it be brought near an hot or cold body, than the ſame wool wrought into a cloth of a firm texture, ſuch as camblet. If men are covered with ſubſtances, which either from their ſpecies or texture receive heat or cold more quickly, and theſe ſubſtances are moiſtened with water, fevers will more frequently enſue than if they were covered with ſubſtances that receive heat or cold more ſlowly.

Moifture in the air, or coverings of the body, produce more fevers, the warmer the atmofphere, but moiſture produces fever in all temperatures. The Dutch have endeavoured to make the country of Batavia reſemble Holland in the immense number of canals. The conſequent moiſture of the atmofphere is very great in both places ; but,

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although fevers, therefore, frequently occur in Holland, they bear no comparison to those which happen in Batavia, where the fatality, owing to the moisture of the climate, is so great, that it is wonderful any person should ever approach that settlement, but from the absolute impossibility of otherwise obtaining water or food.

When the air is moist in consequence of water evaporating from a marshy country, or from canals in which the water is stagnating, or moving with a very slow motion, fevers more frequently arise than when the moisture proceeds from the sea, large lakes, or rivers confined within their banks, and running with a considerable degree of rapidity. While fevers are frequently produced in the fens of Lincolnshire, few arise on the banks of the Thames. This has given occasion to suppose that some other vapours proceed from such marshes besides water, and produced the disease. It certainly happens often that a considerable degree of putrefaction takes place in marshy grounds, and more especially in warm climates, but it is
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by no means to be concluded, that moisture in the atmosphere always produces fever in consequence of putrefaction. Putrefaction can only take place in animal or vegetable substances. If water, therefore, not impregnated with either, should be in such a situation as to produce moisture in the atmosphere, no putrefaction can take place, therefore, if fevers ensue, they are certainly in consequence of moisture, not putrefaction. Many instances of this may be brought, as in the war which took place in Flanders between the tenth and eleventh years of the present century, an army encamped upon sandy ground, in which water was found in digging less than a foot deep, and occasioned a great moisture in the air, which produced in a few days numbers of fevers, although the army was perfectly healthy before, and no more fevers were produced on shifting their ground. There are a vast many other instances of the same thing having taken place. Besides, fever has often arisen immediately in persons sitting in rooms, the floors of which had been just moistened with pure water. Although therefore substances arising from putrefying ani-

mal and vegetable matters in marshes or other stagnating waters, may render the vapours arising from them more dangerous, yet it does not follow from thence, that the particles of the water forming the moisture of the atmosphere, may not of themselves be the cause of the disease.

Another idea suggests itself, that since water applied in a body, that is to say, if a man immerses the whole, or any part of his body in water, of the temperature of the atmosphere, in which he has remained for some time, or if he throws water of such heat into his stomach, no disease ensues; and since water in small particles in the atmosphere applied to the body is of the same heat with the atmosphere, and is applied to parts of the body only, it cannot be the mere application of the particles of the water that produces the disease; it must, therefore, be something that they apply to the body which occasions it. What this may be is not very clear. As evaporation of water into the atmosphere produces cold, and solution of water in one or all the va-
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pours which constitute the atmosphere, likewise produces cold ; some have conceived, that it was the production of cold which is the cause of the disease, and that, therefore, moisture might only be a means of suddenly applying cold to the body, and that the effect of moisture was to be ascribed to cold. But this the author leaves to future experiment and discussion.

The next cause producing fever is eating certain food.

Putrid and infectious substances applied to the body, as has been already described, may either produce a fever immediately upon their application, or the body may be in perfect health for some time afterwards, to all external appearance, before the disease comes on ; but when fever is brought on by cold, or moisture, the author has already stated that the disease took place immediately, that is to say, either a compleat paroxysm of the disease, or some of the symptoms of the first stage were very sensible, and continued, until in a short time

afterwards, they spread over the whole body, so as to constitute a complete paroxysm. The same thing is to be observed with regard to food, for there is no species of food eaten, which after, it has gone through the digestive organs, has been found to be followed by fever.

When food, therefore, is the occasion of fever, it is by its action upon the stomach, or other organs of digestion.

Food of difficult digestion produces, undoubtedly, a variety of different diseases, of which however, fever is seldom one; the author has never seen it, excepting in one case. But when a person has been afflicted with fever, and recovered from it, either by a natural crisis, the disease going through its natural course, or by medicinal application; if soon after he should make use of food too difficult of digestion for the powers of the stomach, which have been generally weakened by the disease, a new attack of it has taken place immediately, and before the food had passed through the stomach. Indeed, eat-
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ing food difficult of digestion soon after fevers go off, seems to be one of the most frequent causes of the re-appearance of the disease. In a person who has not lately been affected with fever, purgative medicines have never been observed to have been followed more frequently with fever, than in persons who had not made use of any such medicines; but when a person has been lately afflicted with fever, which has been carried off naturally, or by medicines, it has often happened that a fever has returned on using a purgative medicine. This observation, although applicable principally to intermittents, also takes place in continued fevers.

A sudden excitement of any of the passions of the mind, attended with great anxiety, has been immediately followed in some cases with fever, yet these are so few as to render it doubtful, because some of the causes of the first set, before described, which do not produce the disease immediately upon their application, might have been applied, and there may be a coincidence. Yet very immediate attacks of a

compleat first stage, or cold fit of the disease having happened on the excitement of such passions, renders it extremely probable that this is likewise a cause of the disease.

These are all the circumstances that have been observed, to which persons having been exposed, fevers have afterwards more particularly taken place in them.

All the causes, therefore, to which fevers can be ascribed from observations, are : certain substances applied to the body, as floating in the atmosphere, or applied in a fluid form to some part of the body. Sudden exposure to cold. Moisture in the atmosphere. Moisture of the cloaths, or other covering of the body. Indigestible food, or other substances affecting the intestinal canal. Sudden rising of the passions of the mind attended with anxiety. But it happens frequently, that fevers arise without any of these circumstances having been known to precede them,

It is true, that many of these circumstances may have taken place without either the person in whom the fever arose, or any by-stander observing them. As the infectious matter, for instance, rising from a person affected with fever, has no smell, nor taste, nor sensible quality; a man may chance to come near another from whence this substance is rising without observing it, and having received the infection may remain in perfect health for a fortnight, or three weeks, when an attack of fever may suddenly take place, without the patient himself, or any other person being able to imagine that it was in any manner owing to this cause. This is not so much the case with exposure to cold, or any of those causes which bring on fever immediately, or not at all. Even if it were, fevers arise so often without our being able to make out that the patient has been exposed to the causes that have been enumerated, that there must, undoubtedly, be other causes than these, which give occasion to the disease, but which are at present totally unknown. It may not be improper to con-

sider some of these causes that have been supposed to operate.

Eating food of particular kinds has been thought by some to give occasion to the disease. It has been already noticed, that eating food of difficult digestion has often evidently produced relapses in fever, but hardly ever a fever originally, and that only while it remained on the stomach, for various nations live on various kinds of food. The Bramins eat vegetable food alone; many of the Laplanders animal food only; the inhabitants of some countries live on grain; of others on fruits; yet if all the other circumstances be the same, fevers are not more frequent in one of these than in the others. Instances there are very frequently in this town (London) of eating too large quantities of food, and that of very difficult digestion; but fever is not the disease that follows more frequently than in those who have eat food in smaller quantity, or more easy of digestion. The author has shown, in another treatise, that whatever be the food, the fluids produced

duced from it are the same. Those who have believed that eating food of any quality, or, in any quantity, produced fever, have formed the opinion upon mere conjecture, and not accurate observation. It is true, that a man who has already had a ground of fever, may have that fever come on immediately after eating food in too great a quantity, or of too difficult digestion. A man may have received the infection of the small-pox without any external or apparent symptom, and the fever may have arisen a few hours after he had gorged himself with turtle and venison ; but this fever certainly was not to be ascribed to the food. So it might be with any other infection or cause of fever that did not immediately bring on the disease. It requires a frequent succession of one event following another, before one can be considered as the cause of the other. Unfortunately too much stress has been laid upon single observations in medicine.

Men accustomed to wear moist cloaths by habit, acquire an indisposition to have disease produced in them by wet cloaths,
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while those unaccustomed to such covering would be readily affected. So it may be thought that a man used from his infancy to eat any particular species of food might acquire an habit which would prevent him from being affected with disease in consequence of it. And certainly this is the case, for a man who has been accustomed to live on animal food alone (often even in a putrid state) has been found not to be affected with what is called sea scurvy, or a tendency to putrefaction of the fluids, while a man who had lived on vegetable food entirely, if he had used animal only would, undoubtedly, have been afflicted with that disease in many instances. But although there be numberless instances of men changing the food from one species to another, yet there is none the author knows of in which fever has arisen more frequently, all the other circumstances being the same. Excepting, therefore, when food, by its action, while it is in the intestines, produces fever, which happens rarely, excepting in convalescents from fever, there is no ground to believe that the use of food of any kind is a cause of the disease after it has passed the organs of digestion.

The state of the fluids, that is, the properties of the different species of fluids contained in the body, or their proportions, have been stated by many authors as the causes of fever; such as their visciduity, or thinness, their acrimony, or mildness, their different proportions to one another, putrescency, &c. The properties of any species of matter can only be known by experiment. It could not be known even that water was capable of fluidity to one who was conversant only with eternal ice. Whatever, therefore, was said with regard to the fluids of the human body before experiments were made to ascertain their properties, must be passed over in oblivion. Every thing, therefore, that is said with regard to the fluids before the time their properties were investigated by experiments, excepting some of the external appearances of some of the secreted fluids, is to be entirely passed over, as not at all relevant to any explanation of the causes of this disease, or the history of it in any manner.

The first part of the blood which was distinctly marked was the serum. or
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some person about a century and an half ago discovered the red particles. Even Boerhaave was unacquainted with the coagulable lymph, and the properties and varieties which take place in these three essential parts of the blood, are even not well known to the majority of practitioners in Europe. It would appear, therefore, that there is very little ground for resting the causes of disease, whether it be fever, or any other, on what has been affirmed of the properties of the fluids by many, even practical authors, for they knew them not, and did not examine them. The author will venture to affirm from many experiments, that the fluids being in any state of all those varieties which are known, the other circumstances being the same, fever will equally take place. One state only shall be specified which has been laid down by some great practical authors, such as Sir John Pringle as a cause of fever, viz. putrefaction of the fluids. Now we know that the blood in that disease, which is called the sea scurvy, frequently verges so near to putrefaction, that the red globules are broken down into smaller particles, and the coagul-

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able lymph and serum hardly coagulate by heat, yet fevers never arise from such putrefaction. Frequency of the pulse, and various other affections of the system, undoubtedly, arise, and have been called fever, but are by no means that disease meant by Galen and other Greek physicians, if we may call Galen a Greek, Lomius, and many other modern practical authors, and which the author is describing. There is then no ground from experience to believe, that any particular state of the fluids is followed by fever more frequently than any other state, all other circumstances being the same.

It has been already observed, that some of the causes of fever do not occasion it to come on immediately, it being often many days after their application before any symptom of it takes place. In the small-pox, when caught from variolous matter floating in the air, there is no experiment or observation on which we can depend to illustrate what happened in the system between the application of such causes, and coming on of the disease. But the mind of man, when
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it cannot find causes from industrious experiment, or slow observation, takes them from imagination, and, more especially in medicine, which has been considered as a divine art, and springing from inspiration, and many men, therefore, have believed that physicians could divine every thing relating to it, and this, although by no means consonant to the other arts and sciences, possessed by mankind, has even entered into the minds of practitioners themselves. Many instances may be brought from the ancients, many from the ages of magic and romance. Nor has this idea subsided in modern times. The author has heard Dr. Fothergill and others, state, in a serious harangue, their inspiration not only in the knowledge of diseases, without enquiring into their external appearances, but in making prescriptions to flow from their pen without any previous composition in their mind; not in compliance with the prejudices of patients, but from their own belief.

Many authors have laid down, that when the causes of a disease, especially fever, was
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not followed immediately by the fever, but after several days that that cause produced some alteration in the proportion of the blood, or some of the other fluids, which was the occasion of the fever. The knowledge of medicine, however, like all other sciences and arts, is only to be acquired by experiment and observation, and neither experiment or observation has shown that any of the essential parts of the blood have been at all altered in their properties; or in other words, that the blood has been at all altered in its properties from the time of the application of a cause of fever not acting immediately to the time of the disease taking place. The whole experience of any alteration is in the inoculated small-pox, that a small part of the matter in a particular and small part of the body is converted into variolous matter, which being absorbed, produces the disease immediately. There is no reason, therefore, from experiment and observation, consequently, none whatever for believing that fever is ever brought on from any alteration of the quality of the fluids contained in the blood-

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vessels produced by using any kind of food, or by any other means whatever, notwithstanding the very universal opinion so frequently brought forward by authors on this subject that there is.

Of the particular secreted fluids which have been thought from their redundancy, or alteration of properties, to be causes of fever, bile has been the most frequent.

The ancients, whose knowledge of the properties of the matter of the body was very superficial, and depended solely on the external view, on which hypothesis were founded, supposed that the fluids consisted of red blood, phlegm, bile, and black bile, as is well known to those who have looked into their writings, and that to a redundancy, or alteration of the qualities of these, diseases were principally owing, and this idea has continued down to the present day. Bile is conspicuous from its colour and taste, its colour is varied by substances that it meets with in the intestines. This difference of

appearance has made it be considered still as of great importance in disease. But modern enquirers have shown that it is a fluid secreted only by the liver, is not at all contained in the blood-vessels, but formed out of the substances which constitute the blood. There cannot, therefore, be any redundancy of bile in the blood-vessels, because generally there is no bile contained in them at all. Bile may, however, and sometimes does get into the blood-vessels. When it does, being capable of passing through all the secretory organs, it soon shows itself in all the secreted fluids, by giving them a colour, and converting them into a yellow dye, and by tinging all the surfaces of the body that are exposed to the eye, of a yellow colour. When this happens, fever is never known to be produced, or to have followed, or taken place more frequently than in any other state of the body. Bile, therefore, when it does get into the blood-vessels, never can be accounted a cause of fever.

When the secretions of those glands which open into the intestinal canal are encreased

from any cause, the secretion of bile is increased along with that of the pancreatic juice, mucous, &c. When these increase considerably, they are evacuated upwards or downwards. Bile being the only conspicuous one, from its colour and taste, has often been attended to while the others have been neglected. There is no evidence that in these cases the liver secretes a larger proportion of bile than the other glands of the intestines their fluids. However that may be, apparently there is a great quantity of bile thrown out.

There is no instance upon record, nor none the author ever knew, where fever more frequently took place after such increased secretion and evacuation than in any other circumstance. In that sickness, for example, which is produced by the agitation of a ship, vast quantities of bile are often secreted, and evacuated, yet there is no instance of fever having taken place; in consequence therefore, bile getting into the blood-vessels, or secreted in any quantity, cannot be admitted as a cause of fever. When so much has been said by
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many authors of great eminence about bilious fever, is their authority to be thrown aside entirely? Certainly no authority but that which rises from observation and experiment can ever be allowed in true science. It would be great pity to rob patients of their consolation in being bilious or nervous, but medicine is a science which never can be comprehended without much study, considerably more than can ever be given to it by persons following other occupations.

Another cause of fever frequently referred to is heat. Heat may be considered in two lights, one of which is when a man lives in a warm atmosphere, or hot medium. In the inhabitants who live in those regions of the earth, where the heat of the atmosphere is great, undoubtedly, many more fevers take place than in the inhabitants of those countries where the heat of the atmosphere is less. It is by no means proved by this that the surrounding medium occasions fever; for it is to be observed, that in warm climates where there is no moisture in the atmosphere, from stagnating waters or other causes,

fevers do not arise more frequently than in colder regions. In Egypt, where the Nile overflows its banks, with fertility to the soil it gives moisture to the atmosphere, which is frequently the cause of fever. The same thing happens from the overflowing of the Senegal and Gambia on that coast of Africa which borders upon the Atlantic Ocean. In the isthmus of America, when at particular times of the year there are great falls of rain, fevers take place frequently, and so it happens in the rainy season in all other hot countries. Where hot countries have been over-grown with woods, filling the air with moisture, fevers very frequently arise, but when the country has been cleared, and the air, by that means, rendered dry, these fevers have diminished in proportion to the cultivation, as in the case of the sugar islands. In America, and the islands in the Pacific Ocean, which are neither subject to violent rainy seasons, nor kept moist by stagnating water, or close woods, although the inhabitants are numerous, fevers are not prevalent. The countries which lie to the north of the Cape of Good Hope, in Africa, are

are the hottest in the earth, but being likewise dry, fevers are not prevalent. Artificers employed in trade, where they are often for many hours in an atmosphere heated to more than 150° , are by no means peculiarly affected with fever.

Fever has never been observed to arise in those who have used a warm bath, nor were the baths of the ancients, though they remained a considerable length of time in air heated to a great degree, ever observed to produce the disease.

The remaining, therefore, in a warm medium, a shorter or a longer time, cannot simply be admitted as a cause of fever.

When a man remains for some time, that is to say, from a quarter of an hour to two hours, in a very great degree of heat above the common heat of the atmosphere of the country where he lives, as in England, in an heat of 120° , 130° , or 140° , or more, the pulse beats quicker to perhaps 120, 30, 40, or 50 strokes in a minute, the whole

culation is encreased, not only in rapidity but force, and this force of circulation subsides very gradually afterwards, although a man goes suddenly into a much colder medium. The Russians, for instance, from what they call the warm bath, which is remaining in a chamber moist, and heated often to more than 140° , plunge themselves into water nearly at the freezing point, or even into snow, without fever or any other disease ensuing. It might be imagined in this instance, that disease was prevented by an habit from infancy, but the author has had experience of many persons coming out of mediums, heated to these degrees, without any disease whatever having taken place, although they exposed themselves suddenly to cold in such a manner, as many of them must have fallen into various diseases, if they had remained for an equal length of time in a chamber heated to 86° , or 90° , and then exposed themselves suddenly to cold in a similar manner. The author does not mean to attempt any explanation of this fact; he only observes, that the difference, when the appearances take place, is, that in cases

cases where a man has been in a considerable degree of heat for a great length of time, and suddenly comes into a colder medium, the exterior veins continue turgid, the skin feels warm to the person himself, remains of a florid colour, and not contracted; whereas, when a person has been in a more moderate degree of heat for an equal length of time, and comes into a colder medium, the exterior veins disappear, the skin contracts, coldness is felt in a great degree, considerable paleness appears on the body, or sometimes it assumes a livid hue.

Many other causes of fever have been assigned, but with so little foundation that they are not worth while noticing. Neither is it worth attending to the infinite quantity of absurd assertions that have every where been made in medicine, unsupported by observation, which is the only evidence. Who would make an experiment upon men, which would determine whether any application would produce a fever or no? and the diseases of brute animals, as well as their whole economy, is so different from
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that of the human body, that no conclusion can be drawn from the one to the other. This a maxim the author's experience has shown him to be perfectly true.

The next point to be examined in the causes of fever is, whether they are capable of co-operating with one another. This is a point very difficult to ascertain, particularly as all the causes of fever that we know are so frequently applied under apparently the same circumstances, without producing the disease. The evidence is so incomplete, that the author dare not venture to make any conjecture on the subject.

The next consideration with regard to the causes of this disease, although the author has treated it in a paper already published, yet it would not be proper to omit it here. If a body be put in motion by an impulse, and no resistance be made to that motion, it will continue to move on, in the same manner, and in the same direction with the same velocity, although no new impulse be made. In like manner, if a
fever

fever be produced by any cause it will continue, although that cause is no longer applied. This proposition, as far as the author knows, has not been given by any writer on this disease; it is, therefore, brought forward with great diffidence. On the contrary, it has been laid down by Sydenham, very distinctly, as well as by almost all the authors who have treated this subject, both ancient and modern, that the original cause of the disease was constantly acting to keep it up. Sydenham, as well as various others, has said that some noxious matter had got into the body, exciting certain movements, which they call concoctive, by which it was destroyed, and thrown out of the system. It is true, indeed, Van Helmont supposes that there is a kind of spirit, which, however, was to be overcome, and expelled; and Dr. Cullen, that a spasm was induced, without entering into any consideration that the spasm, whatever it might be, required its cause to be constantly kept up or no.

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The proposition is, when a cause of fever has been applied to the body, and produced the disease, whether the disease will go on if the the cause be entirely removed, or whether it requires the constant application of the cause for the continuance of the disease. The author, on considering the history of the disease, as it has been laid down by authors who have frequently seen fever, and who have related particular cases of patients afflicted with it, or its general history, as deducted from their observations as well as from his own experience, is clearly of opinion, that a fever once produced will go on, although its cause be entirely removed, just as a body put in motion will continue in motion, although the impelling body be entirely removed, if it meet with no resistance. That is, if infectious matter of any kind be applied so as to produce fever, that fever will go on, although the infectious matter be entirely removed, so that no particle of it is either contained in the body, or touches it externally. That if any of the passions of the mind, attended with anxiety, produces fever, the fever will go on, although

though such affection of the mind be entirely removed. That if fever should be produced by a sudden diminution of heat in the surrounding medium, supposing that the body is afterwards kept in a medium, the temperature of which was perfectly uniform, and of any degree of heat, the fever will go on perfectly. That if fever is produced by moisture in the atmosphere, it will go on if the patient is kept in a completely dry atmosphere. That if fever is produced by putrid matter applied in any way to the body, the fever will go on if no putrid matter of any kind is contained in or applied to the body. Each of these positions ought to be demonstrated by great numbers of particular instances adduced; but relating the observations that have been made by practitioners, as well as those which have occurred in the author's own practice, would render this work much too voluminous.

The next point to be observed in the action of the causes of fever is still newer. If a body be put in motion by any impelling power, and meets with no resistance after
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having received the impulse, it would continue its motion for ever with the same velocity in the same direction. But if the same impelling power should be applied to it a second time in the same direction, the velocity of its motion would be encreased in that direction, and every time this was repeated, the velocity of the motion in that direction would be constantly encreased, and if any other impelling power should be applied in the same direction, the velocity and motion would also be encreased in the same direction. Therefore, in fever, if a cause was applied so as to produce fever by analogy, we should expect that the same cause being again applied should encrease the disease; or that any other cause of fever being applied should also encrease the disease, and so it has always been taken by authors. As the author has already said in the paper before alluded to, it occurred by accident in inoculating for the small-pox, making a puncture one day that he was not sure was sufficient to produce the disease, a puncture was made in the same patient a day afterwards; each puncture produced an inflammation which came

to suppuration. Although fever was produced when the first inflammation came to suppuration, when the second came to suppuration, no encrease of fever took place; and it is farther observed in that paper, that the natural infection, as it is called, of the small-pox, requires generally thirteen or fourteen days after it is applied to produce the disease, while, if the matter be applied to a wound, as it is in inoculation, the disease takes place in seven or eight days after the matter is applied. If, therefore, a person has caught the infection of the small-pox in the natural way, that is, by the matter floating in the air being applied to some part of the body, if a wound be made two or three days afterwards, and variolous matter be applied, the fever will be produced in consequence of the matter applied to the wound, and when the fever would have arisen in consequence of matter applied in the natural method, no additional fever, if one was already present, will take place, nor will any fever come on if it has gone off. Since the causes of fever are frequently applied to persons in health without producing the disease, a question

tion arises, whether in any given number of persons affected with fever, and an equal number of persons not affected with fever, any cause of fever should be applied? whether in the persons in perfect health that cause would produce fever more frequently than it would produce a new fever in those who have been already affected with the disease, or would encrease the fever already existing? From analogy, in the common incidents of life, one would immediately conclude that such cause of fever would more readily encrease one already existing, and would be equally, or more ready to produce a new one. But observation, not only in the infection of the small-pox, but in other cases, contradicts this idea. In order, however, to investigate this point, two things are to be considered. In the first place, whether two fevers can be present at once? or whether one fever only? To those who are conversant only with those authors, who have written from their practice since the revival of science in Europe, and have not grounded their arguments on the writings of the Greek physicians, which include likewise the Arabian, and a few Roman practitioners,

tioners. This may seem a question not to be worth considering, yet the Greek authors who are extant describe diseases in most cases with greater precision than the modern Europeans, and it was with them an universal and decided opinion, that two fevers might exist at once. The proposition, therefore, to be recurred to is, whether a fever being once produced ; a new cause, or a repetition of the same cause ; is more likely to produce a second fever ; or an encrease of a fever already existing ; than to produce a fever in a person in perfect health. In the small-pox, new variolous matter applied after a fever has been already produced, will neither produce a new fever, nor encrease that which has taken place, and farther, when it has once produced fever, it is never capable of producing another. The author has applied variolous matter to wounds in himself, and many others who have once been affected with the fever produced by this cause, without any new fever being produced, although inflammation in the wound has taken place. The same is true, when fever has been produced by any other parti-

cular species of matter, has been applied any how to the body, so that inflammations have taken place on the skin, and matter has been formed, which, applied to a person who never has been afflicted with a similar fever, followed by such eruption, is capable of producing the disease.

When peculiar kinds of matter have been formed in the body (but not in consequence of inflammations of the skin), capable of producing fever when applied to a man in health, such matter, after having produced one fever, may produce a second, third, or fourth in the same person; as, for example, when the common infectious matter produced in the bodies of all persons affected with fever, has once produced the fever, the patient has gone through the disease and recovered. By a fresh application of the same species of infectious matter, a second fever may be produced in the same person, as almost every practitioner who has seen a great number of patients, must have found from his experience. But in the first place, if that infectious matter which is produced in the bodies of all persons

sons afflicted with fever, has produced the disease; according to the author's observation; as well as that of many other authors, who have frequently seen the disease; the repeated application of such infectious matter neither encreases the disease, nor brings on a new fever nearly so often as it originally produces a fever in a man in perfect health. Proof of this depends on this circumstance. In hospitals, where persons ill of other diseases have a fever produced by such infectious matter; when they remain in the same ward where they received the infection, and where they are constantly exposed to it, during the progress of the disease, (it arising from several other patients, in the same ward,) go through the disease exactly with the same circumstances as those who have accidentally received the infection, and are in large rooms where they are exposed to no other infectious vapours excepting those which arise from themselves.

Every practitioner conversant in fevers, that have taken place from infection, such as is produced by fever, in the higher and

lower ranks of life, will be perfectly convinced, upon reflection, that a fever taking place from infection in the most wealthy and noblest persons in the country, and treated with all attention, with regard to infection, goes through its course in the same manner as in a patient in an hospital, where there are many others afflicted with the same disease, provided that attention is paid that there shall be an equal change of the air in the atmosphere, and freedom from putrefaction.

It follows, therefore, that when matter which produces fever followed by cutaneous eruptions has once been applied to the body so as to produce the disease, a second application of it will neither encrease the fever already produced, nor occasion a new one. When matters of other kinds are applied to the body, so as to produce fever, a second application seldom encreases the disease, and is less apt to reproduce it than it is in persons never afflicted with the disease.

The same thing is also to be said of the other causes of fever.

Since

Since the application of the cause of fever is not necessary, for the continuance of the disease, the next thing to be enquired into is what happens farther in it.

The first attack of the disease may be fatal, in the first, or any subsequent paroxysm.

When the first attack of fever has been fatal it has been classed among sudden deaths, and all of these have been called very erroneously apoplexy or syncope. When subsequent paroxysms of the disease have been fatal, the expectation of the disease at a certain time has shown it to be fever. The appearances, however, are the same, both when the patient dies in the first or subsequent paroxysms, viz. symptoms of depression of strength, contraction of the small vessels, and affection of the stomach.

When the attack is fatal it sometimes kills in five minutes, sometimes it requires half an hour, seldom longer than that time. While the patient is yet sensible, violent head-ach with great sense of chilliness take place, the ex-

tremities become very cold, and perfectly insensible; there is great prostration of strength, so that the patient is incapable of supporting himself in an erect posture; he becomes pale, his skin of a dirty brown, and he is soon insensible to external objects; the eyes are half open, the cornea somewhat contracted. If the patient goes off very soon, the pulse is diminished, and at last lost, without any frequency taking place, but if it be longer before he dies, the pulse becomes excessively small and frequent, all the appearances of life gradually subside, and the patient is carried off. Of this, the author has seen instances, sometimes at the first attack, oftener in the returns of the disease, although but very few; he believes them to be much more frequent in warm climates, where the moisture of the country occasions intermittents, than in colder regions.

Since, when the attack of fever cuts off the patient in eight or ten minutes, the pulse does not become frequent, it would seem that this frequency was not a symptom necessary to constitute fever; for if a disease should

should kill without a symptom, that symptom undoubtedly cannot be essential to the disease.

It is rare, however, that fever is fatal in its attack. It has been already shown, that its continuance does not depend upon its original cause, it must therefore have some progress of its own; either it must remain exactly in the same situation in which it was produced, or some variation must take place. It is true, indeed, that if the subject be taken up a priori, it would *prima facie* be concluded, that if a cause produced an effect, and was no longer applied, that that effect would continue precisely the same. But this is not the case with the human body, there are powers in it which retard or repel those variations that are produced by the causes of disease, and so it happens in fever. There are powers in the body, which, when the fever is once produced, repel it, and bring the patient back again to the healthy state. It is very true, that what these operations are which repel fever is not known, as far as the author is able to judge,

but the external appearances which take place during their operation are perfectly known. The author has, therefore, only to enumerate the appearances which take place during the time that the natural powers of the body are repelling the attack of a fever, from whatever cause it may arise,

The first of these is horror and rigor, in English shuddering and shaking, although the Latin words express the sense better. It is an observation the author heard from Dr. Cullen, which has been confirmed from his own experience and reading, that when in any paroxysm of fever, rigor and horror take place, the patient is never carried off by the accession of that paroxysm. Many observations are however to be made with regard to these symptoms. They are very far from always taking place in every fever, so as to be sensible either to the patient or the bye-standers, or to a practitioner well versed in the disease. When they do take place they happen very commonly in the first accession of a continued fever, not so frequently afterwards;

wards; they take place oftener in the subsequent accessions of intermittent fever; but is very far from being constant in them, although it be true, that when it does take place the patient is not destroyed in that paroxysm by the fever itself, yet it is also true, that many patients escape during the accession of a paroxysm without any horror or rigor taking place.

It is next to be enquired to what part of the body this horror and rigor is to be ascribed. Sensations are generally felt in that place where the cause of the sensation is applied, but this is by no means an universal rule; there are many sensations which are felt in parts of the body different from those where the application is made, as pain is felt in the forehead, for example, when substances are introduced into the stomach which disagree with it; it is therefore difficult to judge from whence this horror and rigor arises. The author's own feelings lead him to suppose, that they arise from affection of the stomach; he does not however mean to insist upon this. As rigor and horror are
sometimes

sometimes absent, so they take place in various degrees. Sometimes the external parts of the body are much affected, and considerable motion takes place in them, and especially in the extremities, in consequence of alternate contraction and relaxation of the muscles; sometimes the other moving exterior parts of the body are put in motion; sometimes, although all the external parts are at rest, contractions and relaxation of the interior parts take place, which patients express by saying they shake inwardly. In which ever of these ways it be, the patient is not carried off, after they begin, by that accession.

When it is observed, that if rigor and horror take place the patient is free of danger from that accession, it is not meant that he is free of danger from that paroxysm, because there are many dangers which may arise during a paroxysm besides that at the accession; yet a patient is rarely if ever cut off in any way in a paroxysm of fever, in which a considerable degree of horror and rigor have taken place, if it be in a simple fever.

Frequency

Frequency of pulse is not a necessary part of fever, since the disease can exist without it, and as an attack of fever may prove fatal to the patient without any frequency of the pulse above its ordinary rate, it follows that this frequency of the pulse is to be considered, not as an appearance of the attack of the disease necessary to constitute the accession, and is therefore to be enumerated among the appearances of the second stage. Not but that it happens often, when a patient is carried off by the first stage of fever, that his pulse becomes much more frequent than its ordinary rate, sometimes 140, 150, or 160 strokes in a minute, or as frequent as can be counted. That, however, does not prevent the author from deeming frequency of the pulse, an accident only in the first stage depending on the flow of blood upon the heart; it seems to be a more decided appearance of the second stage, for a second stage of a simple fever, or an intermittent, it is believed has never been seen without it; yet in continued fevers, the author has frequently seen all the other symptoms of the second stage, without any frequency.

frequency of the pulsation of the arteries above the common rate, which is 73 strokes in a minute; and he has often seen it much below 73, when all the other symptoms of the second stage were present in an high degree. He believes, however, that this is only that the heart is not affected with the disease, or rather that a greater degree of insensibility has taken place in it, than in the other parts of the system, therefore frequency of the pulse should properly be enumerated among the appearances of the hot fit of fever.

The pulsations encrease as the hot fit comes on to 100 or more strokes in a minute, and continue frequent during the whole of the hot fit, and often much fuller and stronger than in the first stage of the disease.

Along with this frequency of the pulse a greater degree of heat takes place, but independent of it, because it bears no proportion to the frequency of the pulse. Sometimes when the pulse is very frequent, the heat to the feel of the patient, to the thermometer,
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and to the practitioner, is less than the natural temperature. Sometimes the heat is greater, when the pulse is by no means very frequent, full, or strong.

The heat of the human body if taken by a small Fahrenheit's thermometer under the tongue, with the mouth shut, is 97° and a half in a person in perfect health. It is the same, if an opportunity should offer of examining it, in any of the interior parts of the body, seldom altering a degree, as long as a man remains in health, whatever temperature the external atmosphere or surrounding bodies may be. How such an exact temperature should be maintained, it is not the object at present to discuss.

The greatest degree of heat the author ever observed in fever, and he has paid attention to this point, is 105° ; he has seen in many authors much greater degrees, 110° and 112° , but never found in any fever either simple, continued, or intermittent, an higher degree than 105° . It varies very much in the hot fit of the paroxysm of a simple and
intermitting

intermitting fever. During the hot fit, it is always above the natural temperature, although sometimes not more than 100° or 102° . In the hot fit of the paroxysms of continued fevers it falls sometimes below the natural standard. The heat by the thermometer in different parts of the body is very unequal in fever. It can be best observed under the tongue. In the extremities it can never be taken perfectly, unless there should be a wound or ulcer into which the thermometer can be introduced; in that case the heat is nearly the same as under the tongue. But, in the hot fit, especially at the beginning, it varies considerably in different parts of the body. In some parts it is 4 or 5 degrees below the natural standard, while in other parts it is as many above it, although the whole body be equally defended from external exposure to heat or cold; and although the circulation appears to be the same in the hotter and colder parts of the body. This happens only in the beginning of the hot fit after it has completely taken place, whether the fever be continued, remittent, or intermittent, or simple, the heat
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comes to be equal over the whole body, except that it cannot be perfectly measured in the extremities, unless there should be a wound into which the thermometer can be introduced.

Although frequency of the pulse and increased heat are often found in the first stage of the fever, yet, it has been shown, that neither of them were essential to this stage, not even when it proved fatal. But both frequency in the pulse, and greater heat are always found in the hot fit, or second stage of a simple fever. It is, therefore obvious, that they constitute a principal part of this second stage, which is evidently a natural cure or means of carrying off the first stage of the disease. This is especially proved by the pulse not only becoming more frequent, but likewise for the most part fuller and stronger in this second stage or hot fit. This indicates a greater difference between the size of the ventricle of the heart, when dilated and contracted, therefore a more extensive contraction of it; and likewise that it exerts itself with greater energy,
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or in other words contracts with greater force, so as to throw a larger quantity of blood into the aorta at each contraction, and to throw it in with greater force, and encrease the circulation throughout the whole system. For certainly, if there be a greater difference between the contracted and relaxed state of the ventricle, so that more blood is thrown into the aorta at each contraction, and the contractions are more numerous, a larger quantity of blood must circulate through the whole body. It is true, indeed, that when it passes from the aorta, it may not circulate through every branch of it, and every capillary vessel with greater velocity; but it must pass through some of its branches, and some of the capillaries with greater velocity. If some of the capillaries, and some of the branches of the aorta are contracted, then it must pass through the others with still an additional velocity, in consequence meet with a greater resistance, which will force it to attempt to pass through those vessels which are contracted with greater force. Since then a number of the vessels are evidently contracted in the first stage of the

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the disease, this would render the solution of the effects of the hot fit, or second stage, in carrying off fever easy, for it would resolve itself into this; that the small vessels being contracted throughout the system, propel a large quantity of blood upon the heart, which stimulates the heart to make stronger exertions, and so throw the blood with greater force into these contracted small vessels, force them open, and thus carry off the disease. And such has been the solution given by those who have precluded any alteration in the fluids from being the cause of the disease.

That the fluids are altered by the hot fit of a simple fever, is a point to be determined only by experiment. But no alteration in them has ever been shown in any fever, much less in a simple one, which continues only 8, 10, or 12 hours. On the other hand, it does not require any precise time to produce an alteration in the chemical properties of the fluids; it may take place instantaneously, much more may it happen in two or three hours. But the possibility of

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such alteration of the properties of the fluids by no means proves that it has actually taken place, any more than the possibility of its not happening proves that it has not taken place.

Upon examining blood carefully taken in the first stage of fever, and blood taken in the second, or even in the crisis, the author in many instances has found no sensible difference. The spontaneous separation of the blood by which the coagulable lymph separates from its water, and the serum, entangling the red particles at the same time, so as to form a coagulum, has been found exactly the same in all the stages, the red particles the same in all the sensible qualities, in as far as could be examined by any chemical process. The coagulum of the coagulable lymph being likewise the same, the serum the same, the superfluous water, putrescent mucilage and salts contained likewise the same. It is useless to detail these experiments, as they are only negative proof that in many cases the fluids are not altered by the hot fit of a simple fever. In other cases

cases alterations have taken place, but not in simple fevers, as will be mentioned afterwards, yet more frequently there is no sensible alteration whatever.

It has indeed been said that the fluids were attenuated, and a thousand things besides, the dreams of speculatists, not confirmed by one experiment, and as such to be entirely rejected.

Until then it is otherwise proved, which there is no reason to imagine it will be, after the attention which has already been paid to the properties of the fluids in fever without discovering any alteration in them; it is concluded that the hot fit makes no alteration in the fluids.

It is next to be considered whether this greater action of the heart, propelling the blood with additional force into the small vessels, really removes the contraction, and so carries off the disease.

There are two distinct parts in the attack of fever; contraction of the small vessels, and depression of the powers of the body. These two are not in proportion to one another, but sometimes when there is a great degree of contraction, there is very little depression of the powers of the body, and depression of strength is not necessarily attended with greater contraction of the small vessels. There is also affection of the stomach, apparently independent of the other external appearances, which contraction, depression, and affection of the stomach together, are possibly no more than the exterior indications of some other alteration, of which no probable conjecture has hitherto been formed. If contraction of the vessels is one of these appearances only, it occasions some hesitation in allowing that removing it, or as it has been called by some taking off the spasm, would cure the disease.

It is first to be considered whether the disease is carried off in proportion to this strong action of the heart; for here a distinction must be made, without which
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great error may be fallen into. Fullness and strength of the pulse, which frequently take place in the hot fit of fevers, as well as in other diseases, has often been called hardness, as has already been observed of the obstruction. Hardness of the pulse is undoubtedly a feel of action in the arteries, and not in the heart; it may exist with a small pulse when the ventricle throws out a small quantity of blood at each contraction, with a weak pulse, as in hectic cases near their end; when the pulse is slow, as in chronic rheumatism; therefore does not at all depend upon the action of the heart; and it has this concomitant symptom, that it produces in the blood a disposition to remain fluid after extravasation, so that the red particles shall fall from the surface before any coagulation takes place, and the upper part shall consist of coagulated coagulable lymph, forming what is commonly called a buff upon the blood. This takes place not unfrequently in a paroxysm of simple fever, but is not necessary, or even common. When it does, it always gives a great disposition to prolong the paroxysm, and convert it into a

compound fever. This appearance then must at present be entirely laid aside.

It is so obvious to suppose, that the strong action of the heart propelling a great quantity of blood with force into the small vessels is that part of the hot fit, which carries off the disease; that this opinion has on first view been universally adopted, and in all the rude ages of medicine stimulants have been constantly employed to encrease this action of the heart, so as to shorten the paroxysms, produce crisis, and render them simple fevers. But on the contrary, when the art has been more refined as by Sydenham in our country; these stimulants have been rejected, as tending to prolong what would otherwise be a simple fever, and converting it into a compound one. It may be affirmed, therefore, that although in rude ages the idea has been formed, that the greater exertion of the heart is the natural cure of the disease; yet when practitioners became more conversant in it, the opinion was entirely thrown aside. Many practitioners who have not considered the subject maturely
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still retain this notion, certainly erroneous.

It must be owned, however, that although the encreased action of the heart produced by spices, wine, and other stimulants, very often prolongs the paroxysm, and converts a simple into a compound fever ; nevertheless, sometimes it has happened, that on exhibiting these stimulants a paroxysm has been sooner, and more perfectly carried off, but this is so seldom, not once in fifty times, and on the other hand the paroxysm has been so frequently prolonged by them, that they do not seem of such utility, as to authorise our employing them in practice.

However the increased action of the heart is certainly greater in simple than in compound fevers, in intermittents whose paroxysms are shorter (and the encrease of action of the heart, by means of stimulants, now and then makes them still shorter) than in a continued fever, so that it can be hardly doubted, that the encreased action of the

heart is one means of the cure of the first stage, although far from the only one.

Other means are therefore to be sought, and the next which offers is some action of the stomach.

It frequently happens that sickness takes place in a simple fever, not in the attack, but in the beginning of the hot fit. Some have imagined that this had such an effect as to co-operate with the strong action of the heart, so as to carry off the disease. They have been led to this more particularly by observing, that certain remedies exhibited, which sometimes produce sickness, do frequently bring on a crisis sooner or more perfectly ; such medicines, for instance, as tartarised antimony, and ipecacuanha. But there are many simple fevers in which no sickness ever takes place, and yet they terminate as perfectly, and the crisis is as complete as in other cases where sickness does take place ; sickness therefore cannot be considered as a cause existing in the hot fit which carries off the disease.

Medicines,

Medicines, such as tartarized antimony, and ipecacuanha, which certainly have a tendency to bring on a crisis, and render that crisis more perfect, frequently, while they do so, produce no sickness. When a large dose of these medicines can be borne upon the stomach, without occasioning nausea, they are more efficacious in rendering the paroxysm shorter, and converting the fever into a simple one, than when the stomach will bear but a small quantity without producing nausea; in this case, indeed, they rarely have any effect.

It is farther to be observed, that there are several other medicines which produce sickness in as violent a degree, such as squills, which, in whatever dose they are exhibited, have no effect in bringing on crisis in fever.

Upon the whole, therefore, it seems evident that sickness does not tend to carry off the disease, but that the sickness is only a concomitant effect of that action of the stomach, which either naturally produces a
crisis,

crisis, or is excited by the action of certain remedies.

A patient not being carried off by the first stage of a simple fever after horror and rigor have taken place, which seem to arise evidently from affection of the stomach. Loss of appetite likewise, and sometimes nausea appearing at the beginning of the hot fit, affords suspicion, that some affection of the stomach, produced in the first stage, has a power likewise of carrying off the contraction of the small vessels, and the inaction of the powers of the body throughout the system, or the cause on which these external appearances depend. For the stomach has very great influence on the other parts of the system, as appears from the effect of many medicines which have their operation entirely on the stomach before they can reach any other part. Spices, such as nutmeg, cinnamon, &c. produce a glow of heat over the whole system the moment they are received into the stomach, when they have been thrown into it six or eight hours their effects are entirely gone off, and

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instead

Instead of a stimulus, languor succeeds. It is well known, that the effects of spices depend entirely on the essential oil they contain; this is far from being volatile, and has no chance, therefore, of evacuation out of the body by evaporation in that time, and it often happens that no other takes place. They cannot, therefore, have their operation in the blood-vessels, or any of the secretory organs. It has been supposed that the nerves of the stomach took them up, carried them to the brain, and from thence to the other parts of the body, but without the smallest proof of any kind whatever. It remains, therefore, that the whole of their operation is on the stomach. Opium likewise, by its operation on the stomach, affects the whole system, for it is not swallowed five minutes, in many cases, before the effects of it begin to be felt, and they are entirely gone off in eight or ten hours, although there be no reason to believe that any part of it has gone out of the system. Perhaps being diluted with the whole mass of fluids, it no longer produces any effect, while, if applied in a more concentrated state

state to the other parts of the body, it would certainly have considerable action. Peruvian bark, exhibited in substance, to the quantity of half an ounce, or an ounce, just before the attack of the paroxysm of an intermittent fever, the time of which is known, will, in many instances, prevent that paroxysm from taking place. The effect, therefore, must be on the stomach, for there is not time for it in this space to be dissolved, and carried into the blood-vessels, it cannot get into the blood-vessels in the form of a powder, if it be exhibited already dissolved in water, or any other menstrum, it is not nearly so efficacious as when employed in powder, the whole of its effect in this case must be on the stomach.

It is sufficient to have enumerated the effects of these medicines to show that the stomach has great influence over the other parts of the system; it is, however, by no means meant that the action of all medicines are entirely, or principally on the stomach. Mercury, for instance, may be exhibited so as to affect the stomach, and produce

duce sickness, but in consequence of this affection of the stomach none of its other powers are exerted. In order that they should be, it is necessary that it should be absorbed, and carried into the course of circulation. For it will equally produce its other effects if it be absorbed from the skin, or any other part of the body. All that is intended to be shown is, that affection of the stomach has very great power over the rest of the system, and very probably co-operates with the increased action of the heart in carrying of the contraction of the small vessels, and inaction of the powers of the body, or the more unknown alteration from the natural state of the system on which these depend.

This increased action of the heart, and affection of the stomach, may be the only efficient powers which take place in the hot fit of fevers, or there may be others with which we are totally unacquainted.

In investigating the effects brought on by the hot fit, we must select those appearances which

which take place in a fever, consisting of one paroxysm only, and which is terminated in eight, ten, or twelve hours, for there are many which happen in compound that do not appear in simple fevers.

The first that shall be taken notice of is fullness and strength of the pulse added to its frequency, which in many instances, is very much encreased above that which arises in, and is a part of the first stage of the disease. It is often much more frequent in a simple fever than in the paroxysms of intermittents, and still more so in paroxysms of intermittents than in continued fevers. In simple fevers, it is not uncommonly 140 or 150 strokes in a minute, full, strong, and very much obstructed. In the paroxysms of intermittents and continued fevers, not unfrequently hard at the same time. But this seldom happens in the hot fit of a simple fever. Some authors have mistaken the obstruction of the pulse for hardness. Sometimes the disease terminates in topical inflammation without any crisis happening, as is hereafter to be described,

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in which case, although the pulse be hard, the fever cannot be considered as simple.

The circulation is, therefore, universally encreased, although unequally. In some of the small vessels in every part of the body, it is encreased, so as to produce redness and fullness of all the parts, and an encreased size of the veins. But then many of the small vessels in every part remain contracted; as may be gathered from the exterior parts, although they have a degree of redness, still retaining that dirty reddish brown; from the contracted state of the secretory organs, and thence the diminution of the secretions, which still continues; and the dryness of the skin and tongue. It appears from these sufficiently evident, that although some of the small vessels are so far enlarged as to let more blood pass through them, yet others remain still contracted. The circulation, therefore, is encreased by the strong, and more frequent action of the heart, and greater difference between the contracted and relaxed state of the ventricle propelling the
blood

blood forward through some of the vessels, while others remain contracted.

At the beginning of the hot fit, and before it is perfectly formed, the circulation is variously affected in different parts of the body, that is, the circulation is evidently greater in one particular part. It frequently happens that one part shall become red and full, while others remain pale and contracted; one arm, for instance, shall be red and larger, while the other is pale and contracted. The veins of the one shall be full, and the blood flow in them more rapidly, while those in the other remain empty. This shall continue for a certain length of time, when that part which was red and full, and the veins distended, shall become contracted, pale, the veins contracted, and empty, while that which was pale, its veins contracted and empty before, shall become full, red, and its veins distended. This shifting, however, remains but a short time in simple fever, perhaps not above half an hour. In paroxysms of intermittents, it continues longer, and still longer in the first attack of

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continued fevers. Universal redness at length takes place in all cases of simple fever; together with fullness, increased size of, and greater circulation through the veins; accompanied however, with appearances of contraction.

The heat is frequently much greater in the cold fit, or first stage, than in the natural state of the body. Even when the patient feels himself very cold, the heat often arises to as great a degree as it ever does in fever. When the second stage comes on the patient begins to feel himself hotter, but unequally; sometimes one extremity is felt cold by the patient, the other extremity hot; sometimes the extremities feel cold, when the patient feels the parts about the thorax very hot. But this inequality subsists the least, and for the shortest duration in a simple fever. The heat is more unequal in the paroxysm of intermittents, and frequently much more in the first attack of continued fevers. The heat over the whole body in a simple fever seems intense to the patient, yet upon application of the thermometer,

mometer, it is often found even less than it was when the patient felt himself cold. When the patient has felt himself universally cold, it has frequently been found 105° under the tongue, but when he felt himself extremely hot it has been reduced to 102° or 103 . It is difficult in these cases to believe the thermometer a perfect measure of heat, did we not know that sensation of heat is extremely fallacious, while we have no reason to doubt that the different expansions of mercury and glass are uniform in shewing the variation of temperature, as they are always the same in every fixed point of heat ; such as in the boiling of fluids under the same degree of pressure, the becoming fluid of solids, &c. Notwithstanding, therefore, that the patient feels himself excessively hot in the hot fit of a simple fever, yet he is really not more so than he was in the cold fit, frequently not even so hot.

There is considerable thirst in the beginning of the first stage of a simple fever, which is greatly augmented in the second stage. It is difficult to account for this

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augmentation. The tongue is not now drier, nor the mouth more affected with the disease. Perhaps, the exertion of the powers of the heart, which we have considered as one of the operations tending to carry off the disease, may possibly create thirst. There is as yet no evacuation by which the proportion of water can be diminished in the blood-vessels. Perhaps it may be the superior sensation of heat, although not accompanied by actual heat, that may occasion this superior sensation of thirst, but this cannot be determined.

The patient is sometimes so much depressed in the attack of simple fever as not to feel any degree of restlessness, but at other times a considerable degree takes place; it never fails to come on most violently in the second stage. If it did take place in the first attack, it is very much increased during the second stage. The patient feels the time gone through infinitely long; a minute seems to him more than an hour; he cannot fix his attention on any object, he does not lie easy, and finds no relief in changing his

posture. It is difficult likewise to say, from what cause this takes place. It is certainly different from that anxiety and oppression which arises about the præcordia in the first stage of the disease.

There are two apparent causes of restlessness and anxiety in the system. One, an accumulation of blood in the lungs, in the auricles of the heart, and in the veins leading to them. The ventricles of the heart can never be said to be oppressed with blood, since there is a period in each of their contractions in which the valve, which is situated between the ventricle and auricle, is shut, no blood can be thrown into the ventricles during the time of their contraction, while they are clearing themselves by propelling the blood into the aorta, or pulmonary artery. In the auricles, there is no such provision, but the blood is pressing into them, even during the time of their contraction, and gives resistance to it. The veins near the heart, if the blood be thrown upon them by the contraction of the veins in the other parts of the body, and the
auricles

auricles are not capable of conveying it away, but must be distended. This produces, evidently anxiety and restlessness. Or restlessness may arise in the first stage from universal contraction of the small vessels, and may continue in the second from the contraction remaining. In the second stage, the encrease of circulation, from the stronger action of the heart through such vessels as become of larger diameter, may add to the distension of the larger veins near the heart. The ventricles, being more dilated in the time of the dilatation, more contracted in the time of their contraction, as appears from the pulsation of the arteries being much greater, and fuller, may, on the contrary, take off the additional quantity of blood, so that, perhaps, the whole anxiety remaining from this cause may not be greater in the hot fit than it was in the first stage.

Another cause of restlessness and uneasiness may arise from distension of the small vessels throughout the system. This produces uneasiness over the whole body, accompanied with anxiety, restlessness, and the same idea

of the prolongation of time. The author however, would not be confident that this was entirely the cause of restlessness in the hot fit of simple fevers; especially at its commencement. There are various causes which may produce it; as many affections of the mind independant of the diseased state of the body; therefore, foreign to the present subject. Not but that the mind is affected in fever as well as the body, but this has been considered as part of the first stage.

There are many diseases in which independant of accumulation of blood, in the large veins near the heart, and tension of the small vessels throughout the system, restlessness, uneasiness, and the idea of the prolongation of time, may be produced. If, for instance, substances get into the stomach which disturb it, without producing sickness or nausea, the same sensation frequently takes place. When substances get into the stomach, which are disagreeable to it, the first operation that happens is, that the small vessels throughout the system are contracted, as appears from the universal pale-

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ness which takes place. The blood is thrown in large quantity upon the lungs, veins near the heart, and its auricles occasioning a sense of weight and anxiety: this may be said to be owing to the fulness of the veins near the heart and in its auricles. After this paleness, universal heat, strength, and frequency of the pulse, swelling every where, cutaneous eruption, inflammation of the head, great tension of the system, and uneasiness, which might be ascribed to the tension, take place. But there are many substances, such as food of high flavour, and producing viscid solution, which, without causing a paleness, nausea, tension, &c. will, if eaten in too great quantity, or if thrown into a stomach not sufficiently powerful for their digestion, occasion the same sense of uneasiness, restlessness, and the idea of the prolongation of time. There may, therefore, be affection of the stomach, independant of sickness or nausea, and independant of any tension, which may occasion restlessness, uneasiness, and idea of prolongation of time. It is not impossible,

since the stomach is affected in fever, that it may be owing to this affection that these appearances take place.

Delirium may take place in the first stage of fever, and in consequence of either the depression of strength in the body, or in the mind, or contraction of the vessels of the brain. Delirium may also take place in consequence of the second stage of the disease, and that in a simple fever. This delirium happens much more frequently in a simple fever than it does in the paroxysms of intermittents. The delirium that takes place in the second stage, would appear to depend entirely on the increased action of the heart; the pulse becoming very full, strong and frequent, there arises pain in the head, dissimilar from the pain which took place in the first stage. That which took place in the first stage is clearly a pain affecting the integuments of the head, perhaps the skin alone, at most the pericranium; but the pain which arises in the second stage, is felt by the patient internally, and gives him the idea that there is something distending the head or the brain,

brain, so as to attempt to burst the cranium. It is not more, nor often so violent as the pain taking place from the first stage of the disease. The delirium it produces, while it remains, is considerable; that is, the patient often mistakes one object for another, although the organs of sensation make still an impression on his mind. He can see, for example, but mistakes one man for another, or for a post. His organs of hearing are often more readily affected, but not with the ideas that would be produced by the same sounds were he in health. The same thing happens with regard to his other senses.

In the mean time, the carotid and temporal arteries beat full and strong, the eyes are rather red, and the face flushed; there is, therefore, reason to believe that this delirium arises from compression of the brain by the quantity of blood thrown up into it by the increased action of the heat.

This delirium, if unaccompanied with hardness of the pulse, by no means retards
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the crisis. But if hardness of the pulse, independant of obstruction, should take place, it often converts the disease into a compound fever.

With these symptoms, as far as they are compatible with them, all the appearances which take place in the first stage of fever continue. Some, however, are incompatible; the pulse cannot be full and strong, and small at the same time, for instance. Otherwise the pain in the forehead, depression of strength, foulness of the tongue, and contraction of the secretory organs, &c. all continue.

Fevers generally differ from one another in the duration of the hot fit. A fever which has been called an ephemera, as lasting a day and a night, although described by Greek physicians as attended with as violent symptoms as any fever, yet by modern practitioners a disease under this name has generally been attributed to excess. Such as drinking too large quantities of wine; or the application of some other such stimulus, which occasions a frequency of pulse and heat, for a certain length of time, this

affection

affection does not in any way resemble a fever, there being none of the other symptoms of that disease.

A simple fever, such as the author is describing, does not often last a day and a night, but is often terminated in eight, ten, or twelve hours; the disease going off does not return again, and then may be considered as perfectly simple; or it does return again, and forms a compound fever, the history of which will be shown in a future dissertation.

Nevertheless, the hot fit in simple fever may remain for a much longer time, may continue two days, or even run into the third, without any fresh exacerbation, and may be carried off. This happens from the prolongation of the second stage, but this is extremely rare.

Much more frequently in simple fevers, the first stage does not continue above two hours, the second stage rarely continues afterwards for more than two or three hours before the crisis begins to take place. It frequently happens that it continues a much less

less time when the disease is not terminated by a crisis, but by an inflammation, or an hæmorrhage.

The first manner in which a simple fever terminates, has been called a crisis. Rome and Italy having acquired their science from Greece, were exceedingly apt to adopt Greek phrases, more particularly in medicine, because almost all the physicians among the Romans were Greeks. But the terms were employed very vaguely. Crisis, for example, was used for any termination of any disease, good or bad. Among the moderns, there is nothing so prejudicial to medicine as the introduction of Greek names, especially as they have been adopted by numbers who do not understand one word of the language. When the term crisis is made use of in the present work, it always means the going off of the first stage of fever in the manner here described.

The hot fit having continued a certain time is the occasion apparently of the crisis, either by means of the increased action of
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the heart and arteries ; the affection of the stomach ; or both taken together ; or, perhaps, by some other operation which has not as yet been discovered. Sometimes one of the symptoms of the first stage gives way first ; sometimes another ; so that it cannot be said which has the priority. When the symptoms of the first stage are carried off, those of the second stage go off of course, being produced by those of the first. So that if the first stage had never taken place, the second would never have come on. Nor does the second stage continue like the first independant of its cause, but leaves the patient as soon as its cause is removed.

It is the symptoms of the first stage that first apparently give way. Sometimes the great sense of weight about the præcordia, sometimes the obstruction of the pulse, sometimes relaxation of the secretory vessels takes place, &c. but the most striking appearance to the patient and by-stander, is relaxation of the vessels of the skin, in consequence of which profuse sweating takes place, which has been supposed by many
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eminent practitioners, to be an evacuation of something noxious to the system, and which was the cause of the disease.

It is difficult to procure a quantity of the fluid, so secreted, sufficient to determine its qualities; some may be procured by taking it off from the skin by a spoon, or by washing the linen in distilled water. By the first method it is difficult to procure more than two or three ounces, in most cases hardly one. It is a fluid not perfectly transparent; its want of transparency depends on an oily matter, which, on standing in a close phial, arises to the surface, and consists partly of expressed oil, partly of the oil which gives the peculiar smell to the body. In both these respects it agrees with the oily matter commonly secreted in the sweat of a man in health. After this oil has risen to the top so that the water becomes transparent, on evaporating it, a mucilaginous matter is found; if the heat employed for the evaporation be under 150° , it is nearly colourless, and perfectly soluble in water again; with a greater degree of heat it acquires a brownish colour.

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Along with this mucilaginous matter, saline substances are found, but in such small quantity, when the sweat is taken from the skin, by a spoon that it can hardly be determined what they are. When taken from the linen of a patient washed in distilled water, filtered and evaporated, natron muriatum, ammonia muriata, and ammonia phosphorata are found. All these substances are found in sweat excited in a healthy body, so that in as far as can be judged from experiment, there is nothing in the matter evacuated by sweating which is not found in health. It is possible, indeed, that something may escape chemical experiment, but it must never be presumed that there is. Too often a possibility of substances or circumstances existing, that the nicest scrutiny could not detect, has been deemed a sufficient proof that such circumstances or substances did actually exist; a proof, and not a possibility, is always necessary to induce the smallest belief of their presence. There is, therefore, the highest probability that there is nothing in this evacuation different from the sweating that takes place in a person in health, and that it arises
merely

merely from relaxation of the vessels of the skin.

Although profuse sweating most commonly takes place in the going off of a simple paroxysm of fever, by crisis, there is sometimes only a gentle moisture on the skin which is at the same time relaxed. The skin returns likewise to its natural colour, but this happens only towards the end of the crisis, or we should rather say, that the true skin receives its natural florid colour from the blood circulating through the small vessels, and overcomes the colouring membrane of the skin, and the colour of the sebaceous matter. Indeed there appears to be more colour in the first stage of fever, from the sebaceous matter of the glands, and the colouring membrane of the skin, than in the natural state, and that this was part of the disease; but this colour will be more concentrated in consequence of the contraction of the skin, since the sebaceous glands will be brought nearer to one another, and likewise the different parts of the colouring membrane of the skin, so as to give, as it

were, a deeper tint. When the contraction of the skin goes off, this colour goes off likewise; but this never happens at first, whether there be much or little evacuation by sweating, but towards the end of the crisis, or when it has compleatly taken place.

The evacuation by sweating takes place very profusely in the greatest number of simple fevers for several hours. But as in some it is but trifling, it would not seem a necessary means of carrying off fever. Probably it is merely accidental, and in consequence of the relaxation of the skin, and continued strong action of the heart; it is to be remarked, however, that no simple fever is compleatly carried off by crisis, without some degree of moisture of the skin.

The urine is also secreted commonly in larger quantity in the crisis of fever; but what is most remarkable in it is, that if it be collected in sufficient quantity, and let stand for some time, it becomes turbid, and flaky chrystals are deposited of a dirty red colour. This deposition almost always takes
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place on the going off of a simple fever by crisis, and that even when the febrile appearances have been very slight, often when it was only an encrease of the natural evening paroxysm of fever. This matter seems constantly to be contained in the urine, even in health, with different appearances. The urine, when first evacuated, is perfectly transparent, and, what is commonly called in liquors, bright, remaining so while it stands in the heat of the human body. We are unacquainted with the state of it in those climates where the heat of the atmosphere is equal to that of the body. If this matter has separated from it by standing, it re-dissolves on being heated, provided no evaporation has taken place.

These dirty, red coloured, flaky chrystals appear constantly, in as far as the author knows, in that crisis of a simple fever, which entirely carries off the disease; if they were wanting, he would hardly hesitate to say, that it was not a paroxysm of simple fever, but that the fever would be repeated, although all the other symptoms denoted
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a perfect crisis. The appearance of these flaky chrySTALLIZATIONS seldom takes place towards the beginning of the crisis, but generally after the sweating has continued sometime. The matter of these chrySTALS has been considered by many authors as the matter that occasioned the disease, changed and made fit for evacuation, but that it is not, will appear from many considerations. In the first place it is always present in health, only not in such quantities as to chrySTALLIZE in flaky chrySTALS, and that at all times in the twenty-four hours. The quantity, indeed, in health is so small as to be hardly weighable, but then when it is copious, if separated from the other parts of the fluid by filtration, and dried; it hardly ever weighs so much as five grains, if we take it from all the urine secreted in twenty-four hours. From the quantity, it hardly can be supposed that it could produce any great variation in the system, much less such a disease as fever. It not only makes its appearance in the crisis of fever, but likewise in many other diseases, both of the system generally and of particular parts, and frequently in diseases where no frequency of the pulse, nor any derange-

ment whatever of the system generally, nor any particular affection of the organs of secretion takes place. The appearance of this substance, therefore, must be considered as not at all essential; but only accidental, perhaps from relaxation of the organs of secretion, although its appearance is of great importance in determining the crisis, not only of simple but of compound fevers.

The mouth and tongue, which were dry in the attack, become moist during the crisis, and the tongue becomes clean. The tongue has been described as covered with a particular kind of crust, which adhered to it as part of itself. In the crisis the crust falls off in a surprising manner. It is known that when any part of the body dies, or is killed by any means, a process immediately takes place, by which that part of the fibres where the living and dead were mechanically united, is converted into a fluid; in consequence the dead and living parts are separated from one another, and the dead parts of course, if they were on any external surface
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of the body, or on the surface of any cavity that opens externally, are thrown off. It is true, indeed, that Mr. Hunter and some other pathologists have held an opinion, that the absorbents took up this part of the fibres ; but it is impossible that an absorbent should take up part of a fibre, unless its continuity had been previously broken by some mechanical or chemical means. There is no mechanical power in the orifice of an absorbent vessel that can break the continuity of a fibre ; it must be broken by the conversion of it, by some chemical means, into a fluid.

It is by a similar operation, that the crust which was formed on the tongue in a simple fever is thrown off, for the crust adheres to the surface as part of itself. This separation is much more conspicuous in the crisis of a simple fever, than in any other case, for the whole takes place in an hour or two, so as to leave the tongue compleatly clean. The edges of the tongue first become moist, but that is where the crust did not cover it, and their moisture is in common with that of the rest of the mouth.

The crust itself comes off in small flakes every where over the surface, leaving at first specks, as it were, where the tongue becomes clean, and others, where the crust still remains, until at last the whole surface of the tongue is entirely in its natural state.

When a dead part is exfoliated from a living part, it leaves the surface of the living part in many cases, in a state of exulceration; in some cases, however, it is left in its natural state; as, for instance, when those sloughs which are formed in the erysipelatous sore throat are exfoliated, an indentation remains in the surface of the membrane; but in this hollow the membrane is perfectly sound, the hollow gradually rises up, and is obliterated. The surface of the tongue is perfectly sound when the crust is exfoliated in a simple fever, it is by no means always so in compound fevers. In the crisis of a simple fever the crust is entirely carried off from the tongue, and it is left perfectly clean, and in its natural state.

At the same time the mouth becomes moist, it was dry from the contraction of the
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secretory vessels of the glands, whose excretory ducts open into the mouth in its natural state. There are four large glands, the two carotid, and the two submaxillary which secrete the saliva at a considerable distance, and their excretory ducts run a considerable way before they terminate in the mouth. In the crisis of a simple fever these glands secrete a larger quantity of saliva, but not so much as to be thrown out from the mouth. It is proper to observe that the fluid these glands secrete is destined to be employed in the stomach. If a larger quantity be secreted than is useful in the stomach, it is evacuated by the mouth. The principal purpose for which the saliva is made use of in the stomach is for the digestion of the food. During the first and second stages of a simple fever no food is thrown into the stomach, or if it be it is not digested there; although little or no saliva be secreted, there being no want of it no mischief ensues. When the crisis has taken place, the appetite is immediately restored, and a greater quantity of it passes into the stomach unperceived. A more

copious secretion of it has not therefore been observed in the crisis of fever, especially in simple ones,

There are various other glands situated in the mouth which secrete mucus ; perhaps saliva, or some other fluids ; these serve to keep the mouth moist, which it becomes by degrees in a very compleat manner, in the crisis, especially at the end. But from none of the glands of the mouth is there any such remarkable or copious secretion, as from the skin or kidneys, nor is there any thing in those secreted different from what is found in health,

The thirst which takes place in fever arises partly from the dryness of the mouth. The thirst, so far as it depends on this cause, must, in consequence of greater secretion from these glands, be removed. But it also depends on the state of the stomach, and it also has been said to depend partly on the want of fluids in the blood-vessels. The large evacuation by sweating which takes place in the crisis of a simple fever, evacuating large quantities of watery fluids, occasions a want of them in the blood-vessels, and therefore

therefore it might be expected to have the same effect, as when sweating is produced by a warm atmosphere, exercise, or any such cause. But this is so far from being the case, that the stomach being relieved from the fever, the tongue being moist from a greater secretion of fluids into it; the thirst which took place in the first and second stages of the disease is carried off; so that although the sweating be profuse, the patient is relieved from this symptom towards the end of the crisis of a simple fever.

In the attack of fever, supposing it to be compleat, less bile is secreted, less pancreatic juice, and there is also less secretion from the mucous glands, and other glands of the intestines through the whole intestinal canal. When the fever is present there is therefore less matter to be carried forward by the peristaltic motion. If food were in the stomach when the fever came on, or even if it had got in four or five hours before, no change being made in that food by the ordinary processes of digestion, during the
paroxysm

paroxysm of simple fever, that part of it which is indigestible does not get into the intestines, and therefore cannot be carried forward by the peristaltic motion. The author likewise suspects, that the canal itself is contracted in the fever, that the food is hardly digested till after the fever if it continues only ten or twelve hours. From the food beginning to digest towards the end of the crisis, but more by the pancreatic juice, mucus, and other fluids secreted into the intestinal canal being formed and thrown into it in greater quantity, from the contraction of the canal going off, and the peristaltic motion returning to its natural state, the evacuation from the intestines comes into its natural state, but is not much encreased in the crisis of a simple fever in common, although in the crisis of compound fevers it is often very considerably encreased. There is no reason for believing any thing is evacuated from the intestines different from what is evacuated in health.

Every other secretion, besides those which have been now enumerated returns to its natural state, and very rarely exceeds it in quantity.

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When a crisis takes place in a simple fever, the feel of obstruction of the pulse goes off, but very variously. Sometimes the feel of obstruction begins to diminish at the commencement of the crisis, and does not go off entirely until it is quite compleat ; sometimes the crisis continues without any diminution of the feel of obstruction of the pulse, till the sweating has gone on for an hour or two, then goes gradually off, and is entirely removed before the end of the crisis.

The frequency of the pulse continues almost always until near the end of the crisis, and its return to the natural state is often not till towards the end ; and after the encrease of sweating, and other secretions are entirely gone off. The fulness and strength if they took place, always begin to diminish at the very first beginning of the crisis, and go off before its termination ; and indeed towards the end the pulse becomes weaker than it is in its natural state. The affection of the stomach, and depression about the præcordia begin to diminish at the beginning of the crisis, and
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gradually continue to diminish, until at last, all affection of this kind entirely ceases; the pain in the forehead begins to diminish at the beginning of the crisis, and is totally carried off before its termination, as is also the depression of muscular strength.

It has already been observed, that this depression of muscular strength is very different from weakness, but the exertions that have taken place during the paroxysm leave the patient exhausted, so that the force of the system is not felt to revive, till some time after the crisis has been quite completed; it then often happens, that the patient falls into a profound and quiet sleep, after which even the vigor of the body is not perfectly restored.

All the other appearances proper to the first stage of the disease are carried off completely, and then, or rather somewhat before, if there were any increased secretions they begin to diminish, and are entirely restored to their natural state, so that the whole system returns perfectly to its natural state; if
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it does not, it is not a simple fever. For although it may happen in compound fevers, that a crisis may take place, leaving some symptoms of the first or second stage, which may go off afterwards without repetition of the fever, yet it never happens in a fever, which compleats its course in 8, 10, or 12 hours, that the disease does not return, if any preternatural appearance whatever, excepting weakness, remains after the crisis. If there be any head-ach for instance, languor, pain in the small of the back, or in short any other slight symptom remaining, the fever recurs, and is not a simple fever.

Although simple fevers continue generally only 8, 10, or 12 hours, yet the first stage may continue an hour or two before the second takes place, and that may continue four and twenty hours before any appearance of crisis; the crisis may continue with slow progress twenty-four hours longer, but still it must be absolutely compleat, and the patient must be left in perfect health, otherwise the disease certainly recurs; but instances of so long a simple paroxysm of fever are rare.

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A simple fever may be terminated in other ways than a crisis, so as to be carried off, but then the patient is not freed from disease, so as to return to his natural healthy state. Its termination in other diseases will be noticed in a future dissertation.

All fevers, according to the author's observation, are either the disease which has been described, or repetitions of it modified in a great variety of ways, and every enquiry into the history of the disease must be founded upon a knowledge of simple fever. Galen is the only one who has argued whether all fevers are repetitions of simple fever with different modifications. All the authors who have treated the subject of fever have fallen into confusion, which can only be avoided by a distinct idea of simple fever, a description of which has been endeavoured to be given in the above pages. In a future dissertation the author proposes to point out the manner in which simple fever is repeated with various modifications, so as to form all the varieties of the disease.





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